Developing RSView Supervisory Edition Applications

RSView Supervisory Edition 3.0

RSView Supervisory Edition Training Guide

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1. Course Objectives

Upon completion of this course, you will be able to develop a working RSView Supervisory Edition project by performing the following tasks:

- Understand the architecture of both standalone and distributed RSView Supervisory Edition applications
- Create a new application in RSView Studio
- Create Areas, HMI Servers and Data Servers within an application
- Configure communications using direct referencing of OPC topics and HMI tags
- Build an HMI Tag Database by manual entry, Database Browser and Database Import & Export Wizard
- Create and run Derived Tag and Event files
- Create graphic displays
- Configure Alarming for HMI tags and view it in Alarm Log files and an Alarm Summary object
- Configure FactoryTalk Diagnostics Logging and Data Logging
- Create Trends to show real-time and historical data
- Configure User Accounts and apply security to graphics, HMI tags and commands
- Learn about VBA Display Code and the SE Client Object Model
- Create a distributed application
- Configure HMI Server and Data Server Redundancy
- Deploy a distributed application to multiple computers
- Configure RSView SE Client and run an application

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2. *Introducing RSView Supervisory Edition*

Objectives:

- Understand where RSView Supervisory Edition fits into the ViewAnyWare strategy
- Understand the different software packages needed for developing and running Supervisory Edition applications
- Understand the minimum hardware and operating system requirements for the Supervisory Edition development and runtime environments.
- Understand how to activate your software
- Understand the general features and functions of an RSView Supervisory Edition application.

What is RSView Supervisory Edition?

RSView Supervisory Edition is a product in the ViewAnyWare strategy from Rockwell Automation. ViewAnyWare is a complete visualization effort encompassing both hardware and software. ViewAnyWare provides a single development environment to create visualization solutions that span from small machine level to large supervisory level projects.

The RSView Enterprise Series refers to the software foundation of ViewAnyWare. The Enterprise Series consists of RSView Studio, RSView Machine Edition and RSView Supervisory Edition.

RSView Supervisory Edition consists of several pieces of software you can use to build powerful automation applications. These applications can be distributed among multiple servers and clients. Depending on the particular software package(s) you purchased and installed, you might have one or more of these pieces of software:

RSView Studio is configuration software for developing and testing machine- and supervisory-level human-machine interface (HMI) applications. RSView Studio contains editors for creating a complete human-machine interface application, and contains software for testing the applications you create. Use the editors to create applications that are as simple or as sophisticated as you need.

RSView SE Client is runtime software for viewing and interacting with supervisory-level applications developed using RSView Studio.

RSView SE Server stores HMI project components (for example, graphic displays), and serves these components to clients. The server also contains a database of tags, and performs alarm detection, and historical data management (logging). The RSView SE Server has no user interface. Once installed, it runs as a set of 'headless' Windows services that supply information to clients when they request it.

FactoryTalk Directory is software that allows the parts of a distributed application to find each other on the network. For example, to access the HMI projects on HMI servers in the application, SE clients use the FactoryTalk Directory to find out which computers on the network are hosting HMI servers. The FactoryTalk Directory can contain multiple applications, allowing you to have multiple automation systems on the same network. This could be useful if you want to develop one application, while another is in active operation. Different applications can be in operation simultaneously, each controlling a different facility within your corporate network. All the computers participating in a particular application share a common FactoryTalk Directory located on a network server.

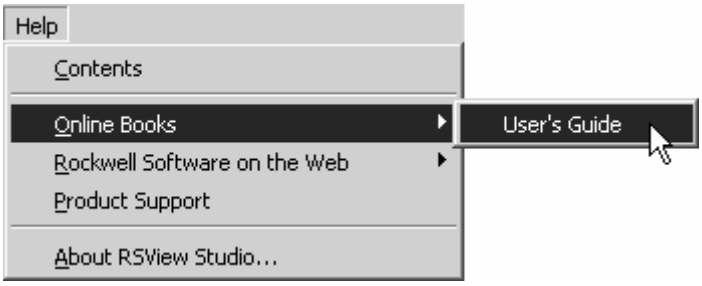
RSView Administration Console is software for administering RSView Supervisory Edition applications after they have been deployed. RSView Administration Console contains a sub-set of the RSView Studio editors, so you can make minor changes to an existing application. There is no licensing associated with RSView Administration Console.

RSLinx for RSView – RSView Studio and SE Server provide activation for RSLinx. RSLinx for RSView serves data from Rockwell controllers to the distributed application.

Where to get Help

There are many resources available to aid you as you develop a Supervisory Edition project.

Standard Windows Online help is accessed from the RSView Studio **Help, Contents** menu or by typing the **F1** key.



The complete User's Manual is also opened from the **Help** menu. Select **Online Books, User's Guide**. This is a .pdf file that requires Adobe Acrobat Reader. The reader may be installed from the RSView Supervisory Edition CD.

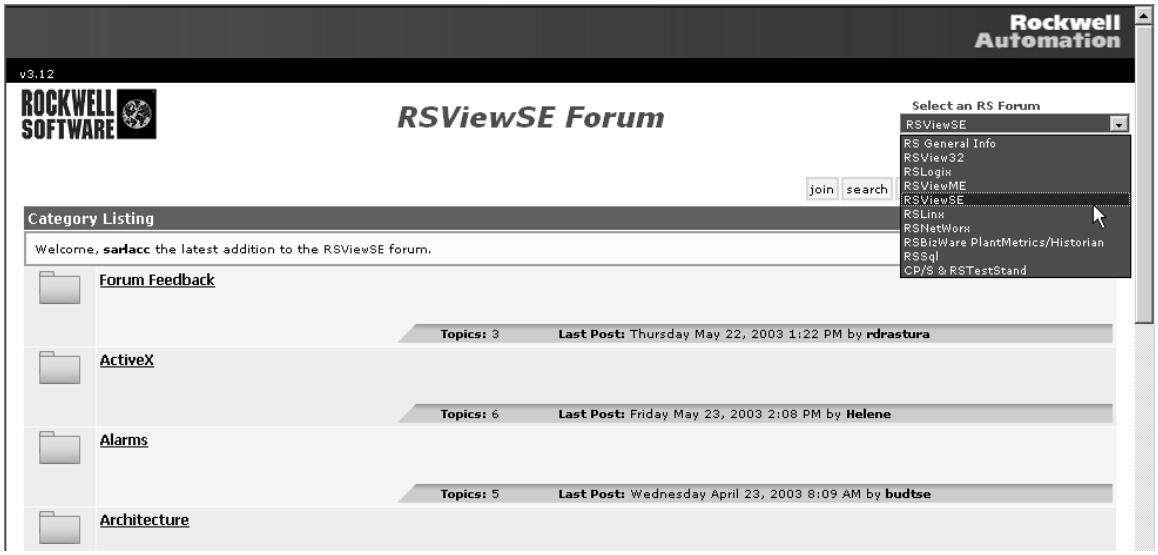
Online

Access technical support, including the Knowledge Base, at

`support.rockwellautomation.com`

The RSView Forum is an online user's group. Access this website at

`www.software.rockwell.com/forum/`



Phone

You may also call Tech Support for any problems. Have your software serial number available, and call (**440) 646-5800**.

Before You Begin

Minimum Hardware and Software Requirements

The hardware and software you use with RSView Supervisory Edition depends on the demands your application places on the system. The greater the demand, the more powerful a system you need. The following are minimum requirements.

For large or complex applications you should use computers with faster CPUs and more RAM. In any application, faster CPUs and more RAM will result in better performance. In addition, there should always be sufficient disk space to provide virtual memory that is at least twice the size of the physical RAM.

RSView SE Server Minimum Platform Requirements:

- Single RSView SE Server running on the computer (with RSLinx)
  - Pentium II or higher, 128 MB RAM or more
  - Windows 2000 Professional SP3 or Windows XP Professional SP1 (up to 10 users) or Windows 2000 Server SP3 (more than 10 users)
  - Internet Information Server.

- Multiple RSView SE Servers running on the computer, or any other significant software application running concurrently:
  - Pentium III or higher, 256 MB RAM or more
  - Windows 2000 Professional SP3 or Windows XP Professional SP1 (up to 10 users) or Windows 2000 Server SP3 (more than 10 users)
  - Internet Information Server.

FactoryTalk Directory Minimum Platform Requirements
- Pentium II or higher, 128 MB RAM or more
- Windows 2000 Professional SP3 or Windows XP Professional SP1 (up to 10 users) or Windows 2000 Server SP3 (more than 10 users)

RSView Studio or **RSView Administration Console** Minimum Platform Requirements:
- Pentium II or higher, 128 MB RAM or more
- Windows 2000 Professional SP3 or Windows XP Professional SP1 (up to 10 users) or Windows 2000 Server SP3 (more than 10 users)
- Internet Information Server to access sample application SE Servers.

RSView SE Display Client Minimum Platform Requirements:
- Pentium II or higher, 64 MB RAM or more
- Windows 2000 Professional SP3 or Windows XP Professional SP1 (up to 10 users) or Windows 2000 Server SP3 (more than 10 users)

RSView Supervisory Edition System Limits:

- The tested and recommended maximum number of RSView Studio clients that can set up an RSView SE application simultaneously is 5.
- The tested and recommended maximum number of RSView SE servers that can be used in an RSView SE application is 10.
- The tested and recommended maximum number of RSView SE servers that can be hosted on a single computer is 5.
- The tested and recommended maximum number of RSView SE Clients that can access an RSView SE application simultaneously is 50.

Using the system beyond these limits is not formally supported.

Domain Controller Requirements

For ease of network and user administration, a domain controller is recommended. All computers participating in a single application must be members of the same Windows NT or Windows 2000 domain. The RSView SE Server and FactoryTalk Directory do not have to be installed on the same computer as the domain controller.

Alternatively, RSView Supervisory Edition can be used in a Windows workgroup environment. In this case:

- All computers participating in a single application must be members of the same Windows workgroup.
- Create the same set of user accounts and passwords on every computer participating in an RSView Supervisory Edition application. For details, see Help provided with Windows.
- If any computer participating in an RSView Supervisory Edition application is running Windows XP, disable simple file sharing in Windows XP. For details, see Help provided with Windows XP.

Activating RSView SE Software

Rockwell Software uses activation files to activate its Windows-based software packages. The activation files reside on the Activation disk. During installation, the software prompts you to insert the Activation disk and move the activation key from the disk to the drive where you've installed RSView.

About the Activation disk

RSView comes with an Activation disk (also referred to as a Master disk) that activates the RSView software. Without activation, RSView runs in demo mode, allowing a maximum of five HMI servers per application and two hours of use on a local SE Client.

The Activation disk contains:

- one or more activation keys

  The activation key is the software that activates RSView. Depending on what you purchased, your Activation disk will have one or more activation keys. For example, if your company purchased four RSView Studio installations, you require four activation keys. The keys are product-specific. For example, RSView SE Client requires an SE Client activation key. Multiple copies of the same software require activation keys with matching serial numbers. All of the activation keys can be on the same activation disk.

- a program called EVMOVE.EXE that moves activation keys to and from computers
- a program called RESET.EXE that reactivates a damaged activation key

Activation keys

The following table lists the activation keys for RSView Supervisory Edition products:

RSV.STUDIO - RSView Studio (allows a test version of RSView SE Server, a 2-hour test version of RSView SE Client, RSLinx for RSView, and full use of RSView Studio, Machine Edition Development and Test Tools)

RSVSESRV.25 - RSView SE Server, 25 displays, and RSLinx for RSView
RSVSESRV.100 - RSView SE Server, 100 displays, and RSLinx for RSView
RSVSESRV.250 - RSView SE Server, 250 displays, and RSLinx for RSView
RSVSESRV.MAX - RSView SE Server, unlimited displays, and RSLinx for RSView

RSVSECLI.RW - RSView SE Client, full function, read/write
RSVSECLI.RO - RSView SE Client, view only

RSVSE.25 - RSView SE Station (for Standalone applications, up to 25 displays)
RSVSE.100 - RSView SE Station (for Standalone applications, up to 100 displays)
RSVSE.250 - RSView SE Station (for Standalone applications, up to 250 displays)
RSVSE.MAX - RSView SE Station (for Standalone applications, unlimited displays)

Installing dedicated or floating licenses

When you install all RSView Supervisory Edition components on the same computer, the activation keys you install on the computer determine which of the components will run.

To activate your RSView Supervisory Edition software, you can make use of floating licenses, or dedicated licenses.

Floating licenses

Floating licenses are installed on the computer running the FactoryTalk Directory software. These licenses 'float' to whichever computer needs them. This means that the license is granted for the exclusive use of any computer while that computer is using the software. When the software is no longer being used, the license becomes available for other computers.

For RSView SE Clients, there are two types of floating licenses: read-write licenses, and view-only licenses. Read-write licenses allow full read-write privileges. View-only licenses allow read-only privileges.

If an RSView SE Client is set up as read-write, and only view-only licenses are available, the client will be view-only, and the activation key will override the read-write configuration of the client.

If an RSView SE Client is set up as view-only, and only read-write licenses are available, the client will use a read-write license, but the view-only configuration of the client will override the read-write activation key, and will allow view-only access to the application.

Do not rely on the activation key to determine whether the client is view-only. Always configure the client explicitly as view-only.

Each floating license requires one installation of the appropriate activation key on the computer running the FactoryTalk Directory. For RSView Studio, an RSV.STUDIO key is required for each user. For read-write SE Client licenses, the RSVSECLI.RW key is required. For view-only SE Client licenses, the RSVSECLI.RO key is required. To increase the number of licenses available, install additional activation keys on the FactoryTalk Directory. Keep in mind, however, that no matter how many licenses you have, you cannot exceed the system limits.

Dedicated licenses

Dedicated licenses are installed on the same computer as the software being used. These licenses ensure that a particular computer will always have a license to use the software. Keep in mind, however, that no matter how many licenses you have, you cannot exceed the system limits.

The software checks for locally-installed, dedicated licenses before requesting a floating license from the FactoryTalk Directory.

Activating RSView after installation

You might need to reactivate RSView after moving activation keys back to the Activation disk, or after resetting a damaged key. To reactivate RSView, move the activation key from the Activation disk back to the hard disk. By default, when you move activation to a hard disk from the Activation disk, the software moves only one copy (license) of an activation key.

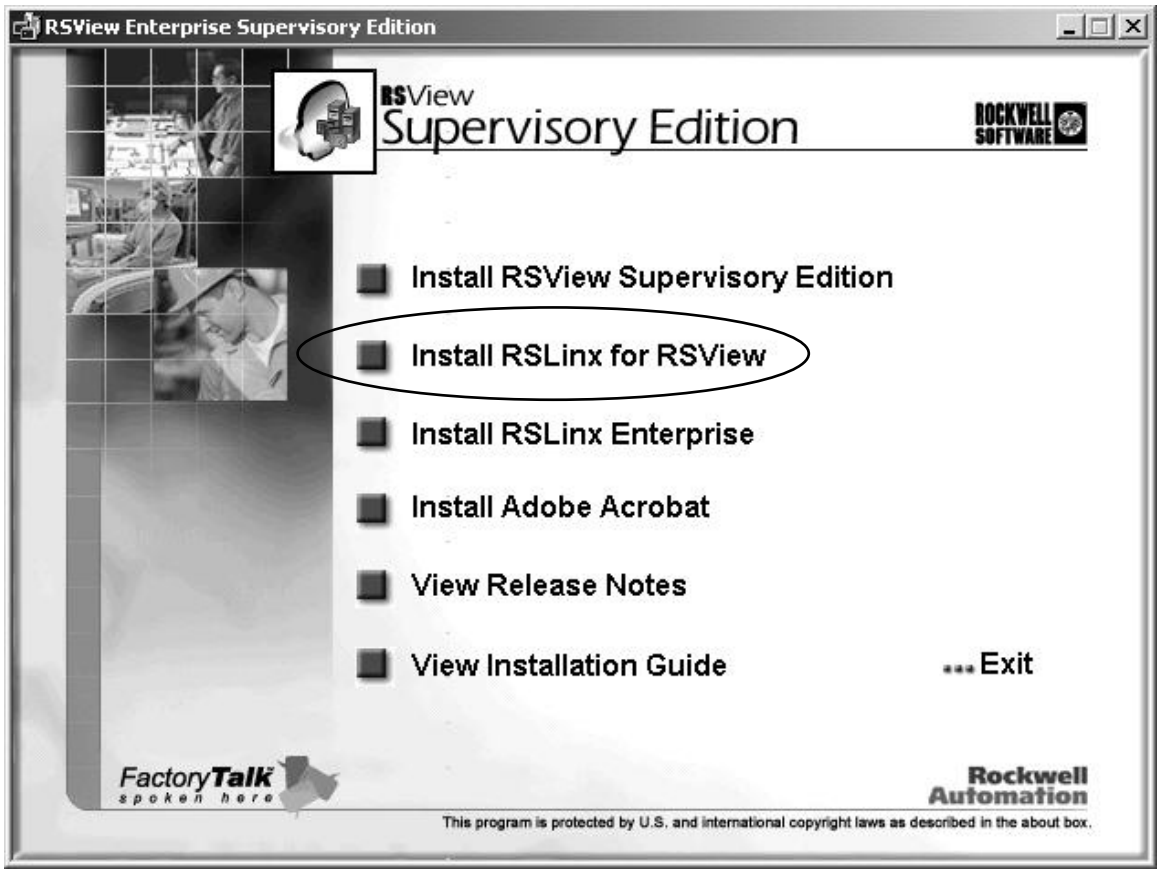
To move activation keys to the hard disk:

1. In RSView Studio, change the HMI server Startup type to On demand for each HMI server in each application. To do this:
    a. Right-click the HMI server and then click Properties.
    b. In the Startup type list, click On demand.
    c. Click OK.
2. Close RSView Studio, and all other Rockwell Software products that are using licenses on this computer.
3. Restart the computer.
4. If RSLinx is installed and running as a service, right-click the RSLinx icon in the system tray and then click Shutdown RSLinx.
5. Insert the Activation disk into the disk drive.
6. Run A:\EVMOVE.EXE where A is the disk drive containing the Activation disk. The EvMove Summary dialog box opens.
7. In the From list, click the drive containing the Activation disk. In the To list, click the drive where RSView is installed. Click OK.
8. Either move activation keys for all installations or for a selected number of installations:
    a. To move activation keys for all installations, click Move.
    b. To move a selected number of installations, do the following:
    c. Click Edit all.
    d. In the Move box, type 0, and then click OK.
    e. Click the activation key you want to move.
    f. Click Edit Selected.
    g. In the Move box, type the number of activation keys you want to move.
    h. Click OK, and then click Move.
9. To close the EvMove Summary dialog box, click OK.

RSLinx for RSView

RSLinx communication software is included on the RSView SE Install CD.

RSView Studio and SE Server provide activation for RSLinx, as long as they are on the same computer. A separate activation is not needed. RSLinx for RSView may be installed from the RSView SE Product CD:

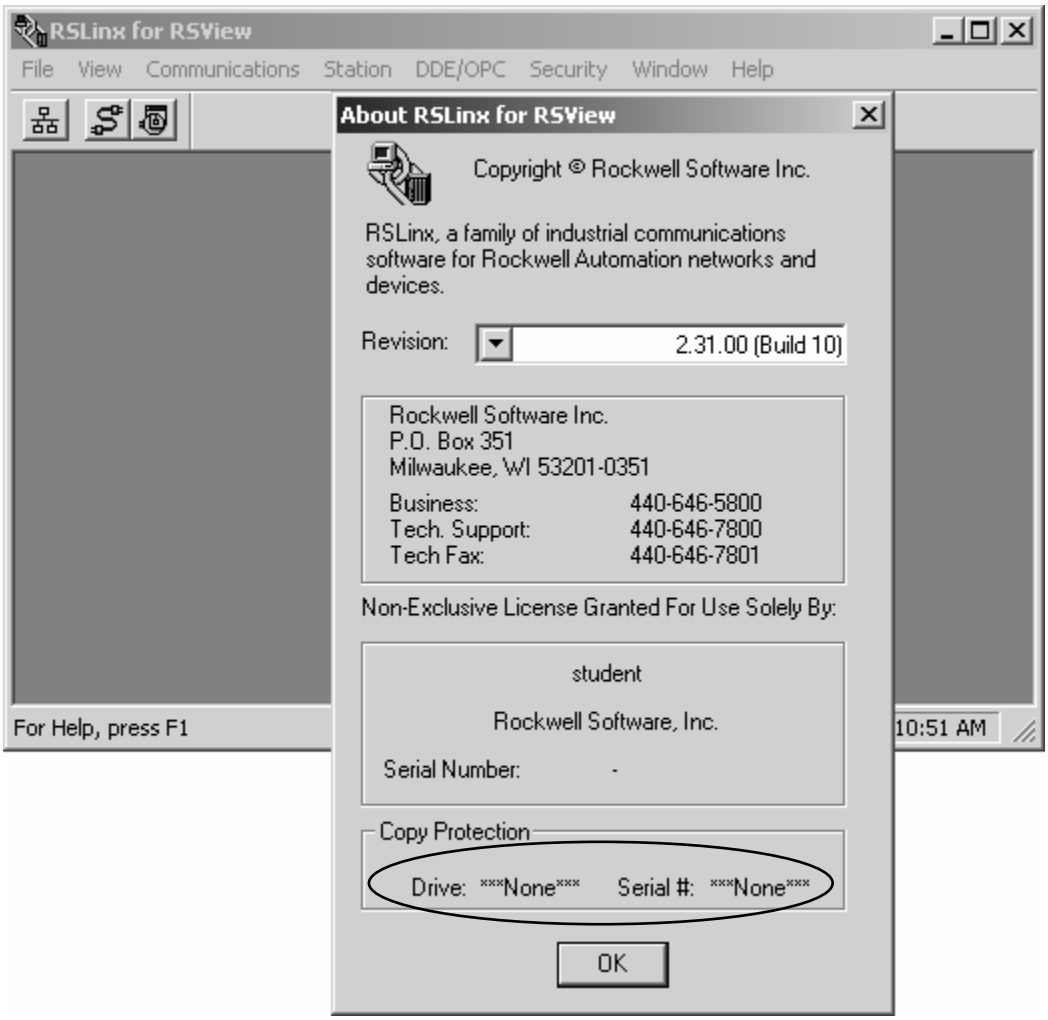


RSLinx for RSView will serve data from Rockwell Automation controllers to a distributed SE application.

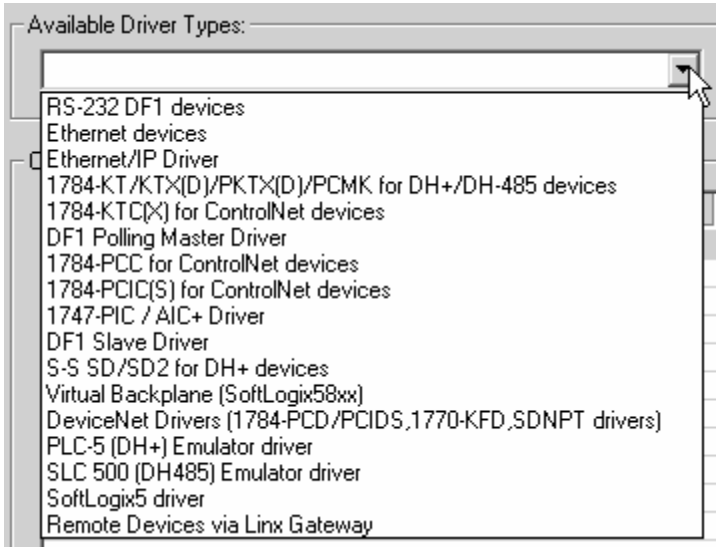
RSLinx for RSView will use the activation from RSView Studio or RSView SE Server.

If the program starts as RSLinx Lite, it has failed to find any activation.

RSLinx will use an existing activation (RSLinx Professional, OEM, Gateway…) if there is one on the computer.



RSLinx for RSView provides your Supervisory Edition project with communication drivers to connect to Rockwell Automation devices:



In addition, RSLinx for RSView is an OPC Server. It serves data to RSView SE, an OPC client.

Note: RSLinx for RSView will only act as an OPC Server to RSView Supervisory or Machine Edition. If you need an OPC Server to other clients, you will need a different activation of RSLinx.

Lab 1 – Working with RSLinx

Objective: Configure RSLinx for RSView to communicate to a SoftLogix 5860 processor. Explore RSLinx tools.

Software Requirements:

- RSLinx
- SoftLogix 5800 Chassis
- RSLogix 5000

Optional

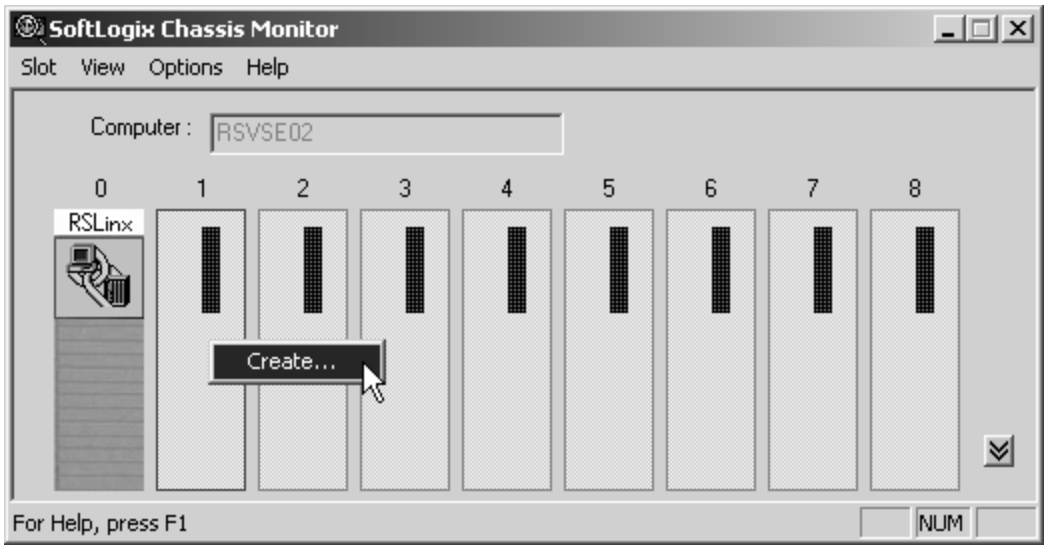
- ControlLogix processor running the **RSView_Class_ControlLogix** program

1. Configure SoftLogix

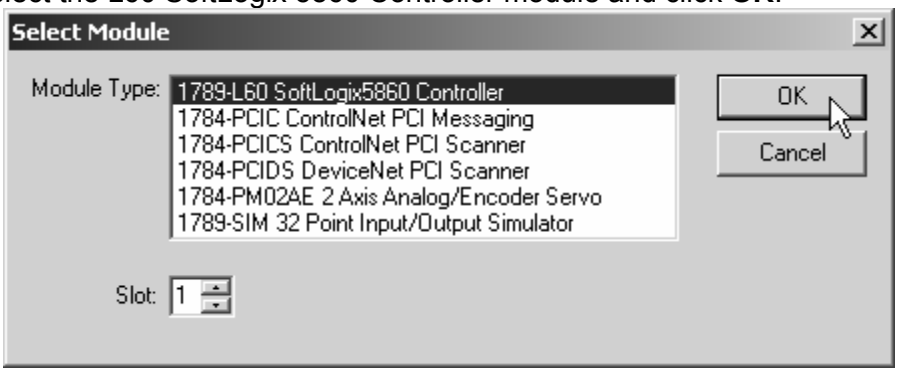
The SoftLogix 5860 processor is a controller that runs in the computer's CPU. It runs a program created in RSLogix 5000. This will be the data source for our lab projects.

- Confirm that the SoftLogix 5800 Chassis Monitor is running as a service on your computer.

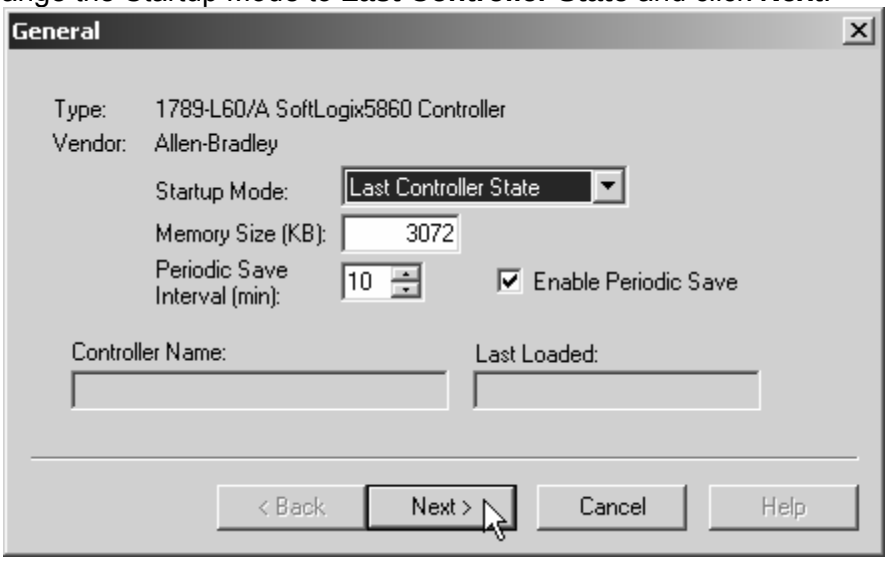
- Click the icon in the system tray to open the SoftLogix Chassis Monitor. It has no modules configured. Right click on the first slot and click **Create**.



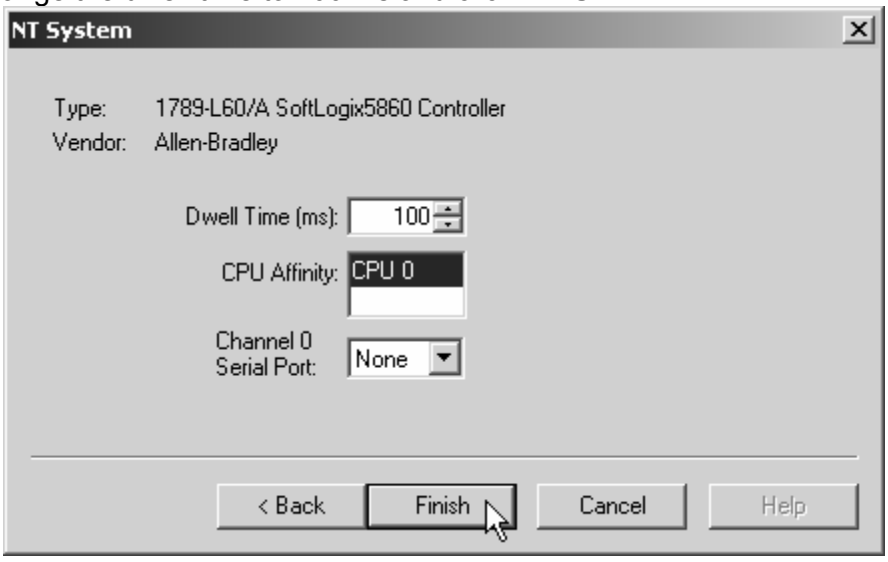
- Select the L60 SoftLogix 5860 Controller module and click **OK**.



- Change the Startup Mode to **Last Controller State** and click **Next**.

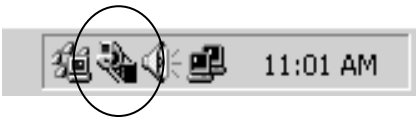


- Change the dwell time to 100 ms and click **Finish**.



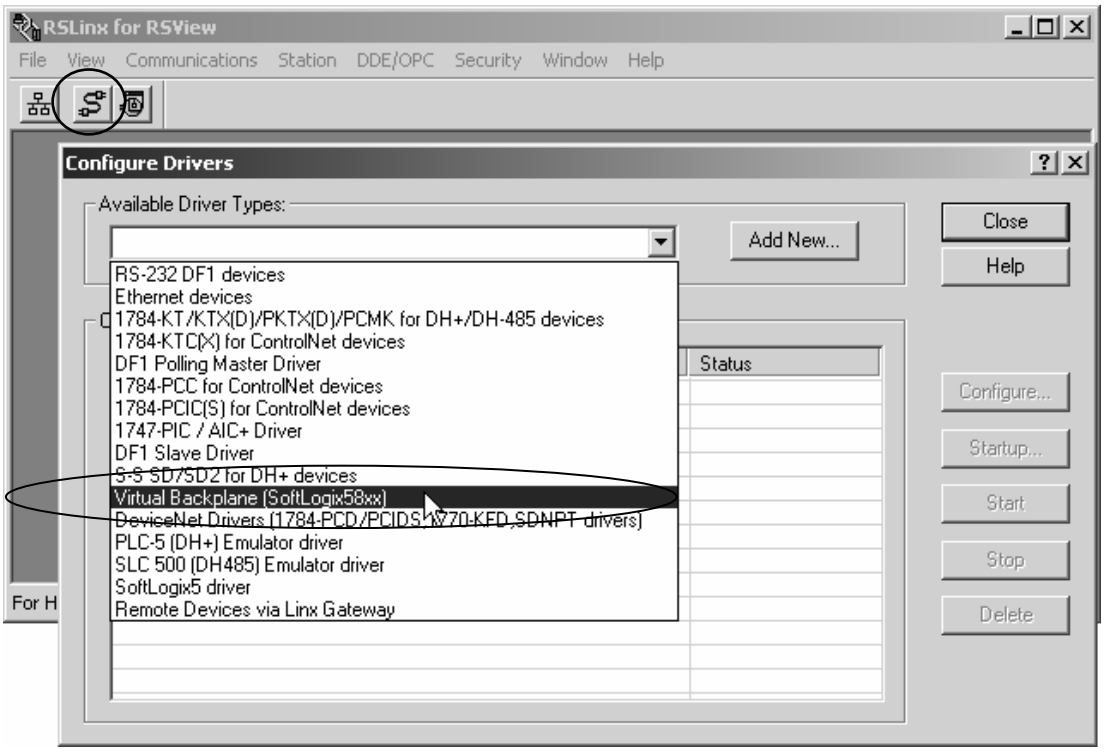
2. Configure RSLinx

- Open RSLinx by single-clicking its icon in the system tray.

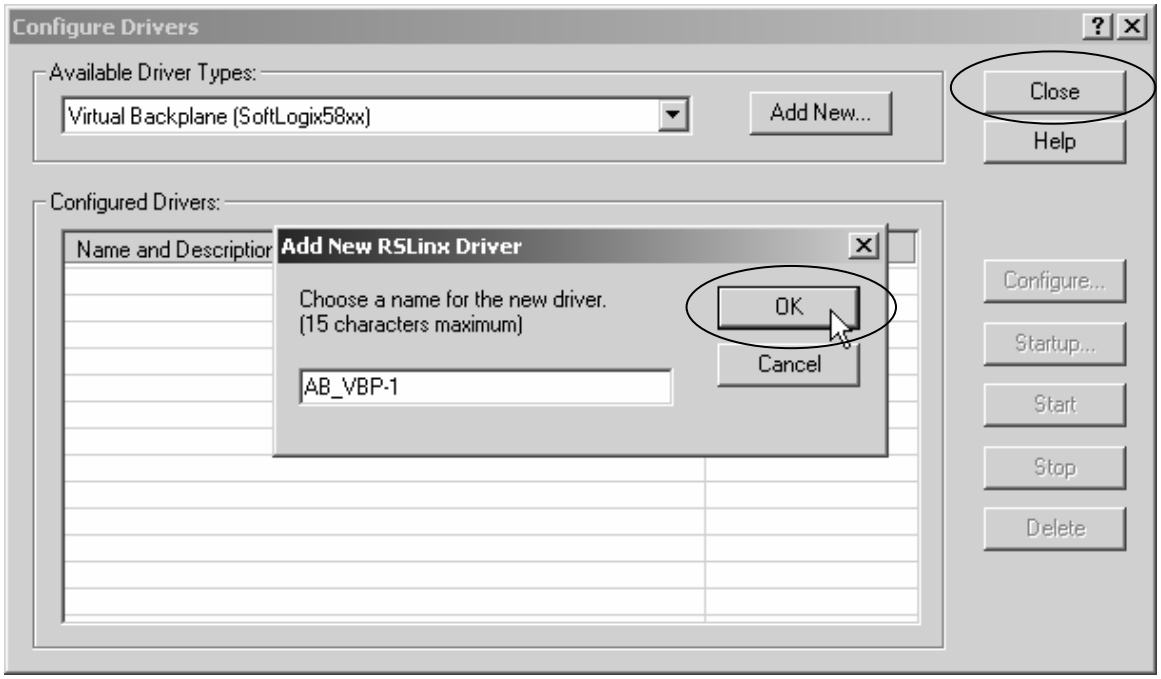


If the icon is not there, RSLinx is not running as a service. If this is the case, start the service by running the RSLinx Launch Control Panel (Start, Programs, Rockwell Software, RSLinx). RSLinx 2.3 will run as a service by default.

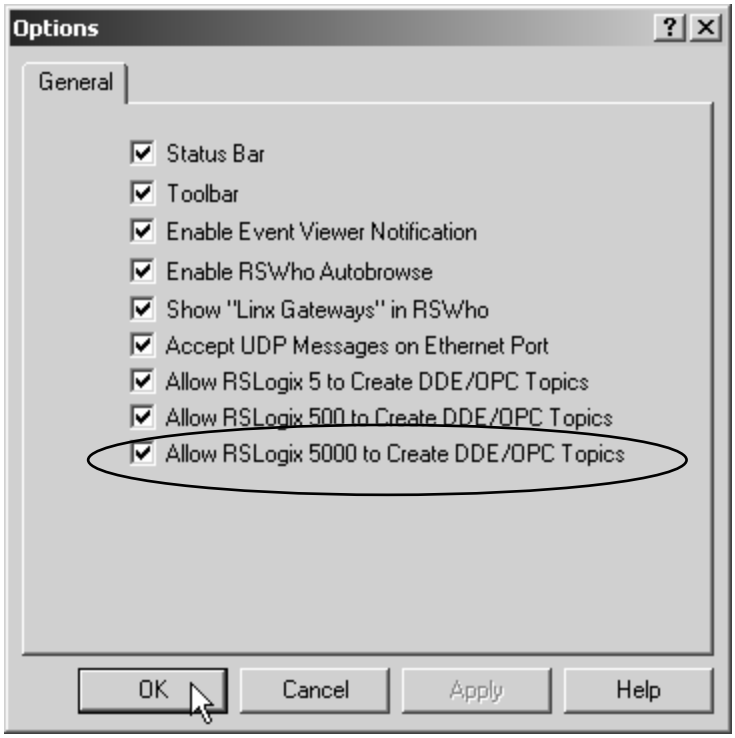
- SoftLogix 5800 uses the Virtual Backplane driver. Configure it by clicking on the **Configure Drivers** icon in RSLinx. Select the **Virtual Backplane** driver.



- Click the **Add New** button. Accept the default name and click **OK**. Click **Close** to exit the Configure Drivers window.



- Select **Options** in the **View** menu. Note that by default, RSLinx will allow RSLogix to create OPC topics. They are created when the RSLogix program is saved and downloaded to the processor. You will use the topic in later labs. Click **OK** to close the dialog box.



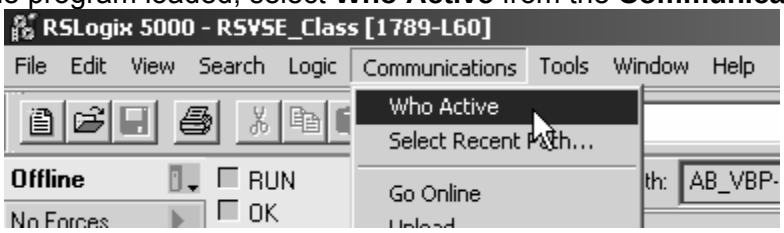
3. Download a program to the processor

- Open RSLogix 5000 (Start, Programs, Rockwell Software, RSLogix 5000 Enterprise Series).

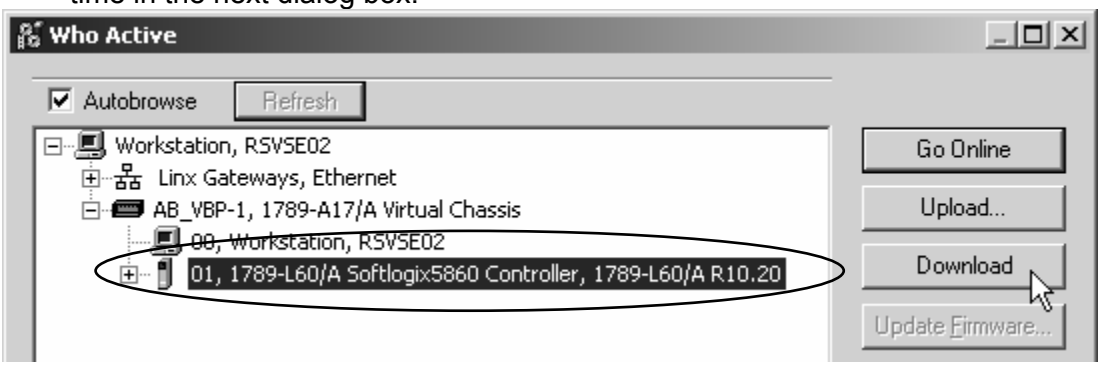
  Open the **RSView_Class_SoftLogix.acd** file from:

  `Supervisory Edition Class Files\SoftLogix Program`

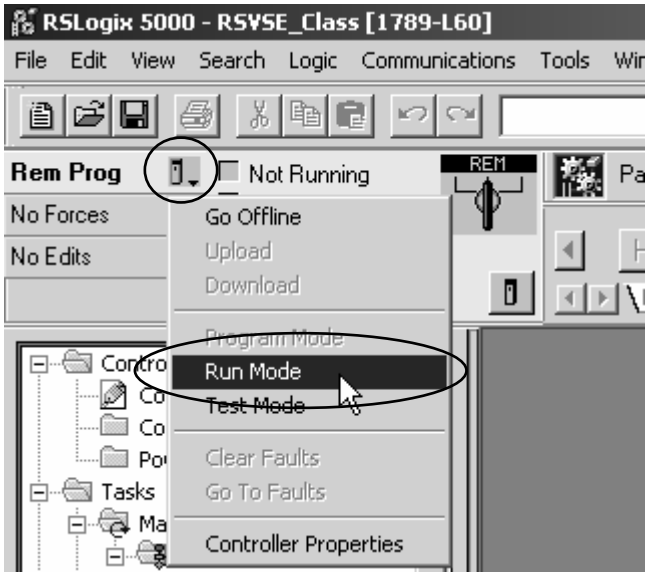
- With the program loaded, select **Who Active** from the **Communications** menu



- Select the SoftLogix processor and click **Download**. Click **Download** a second time in the next dialog box.

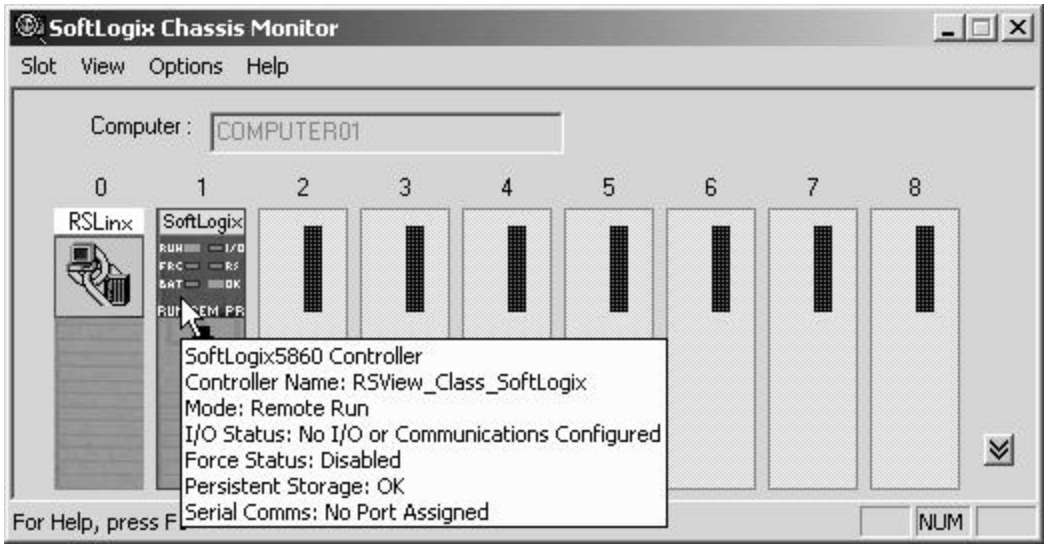


- The program will be downloaded and in Remote Program Mode. Click the Online toolbar, and put the program into Run Mode.



- Close RSLogix 5000

- Verify the running program in the SoftLogix Chassis and then close it.

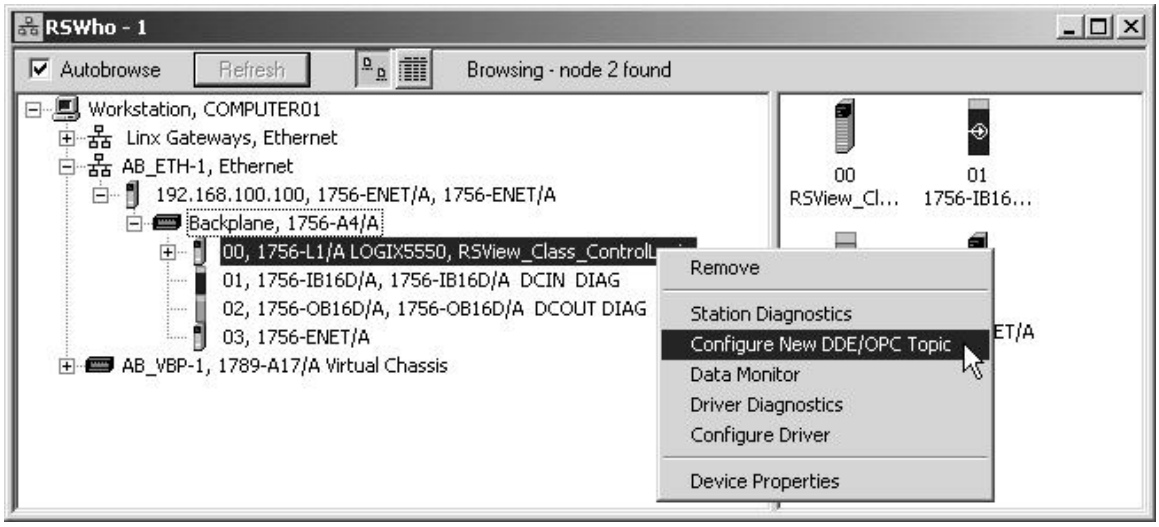


Optional - Configure Communications to a ControlLogix module.

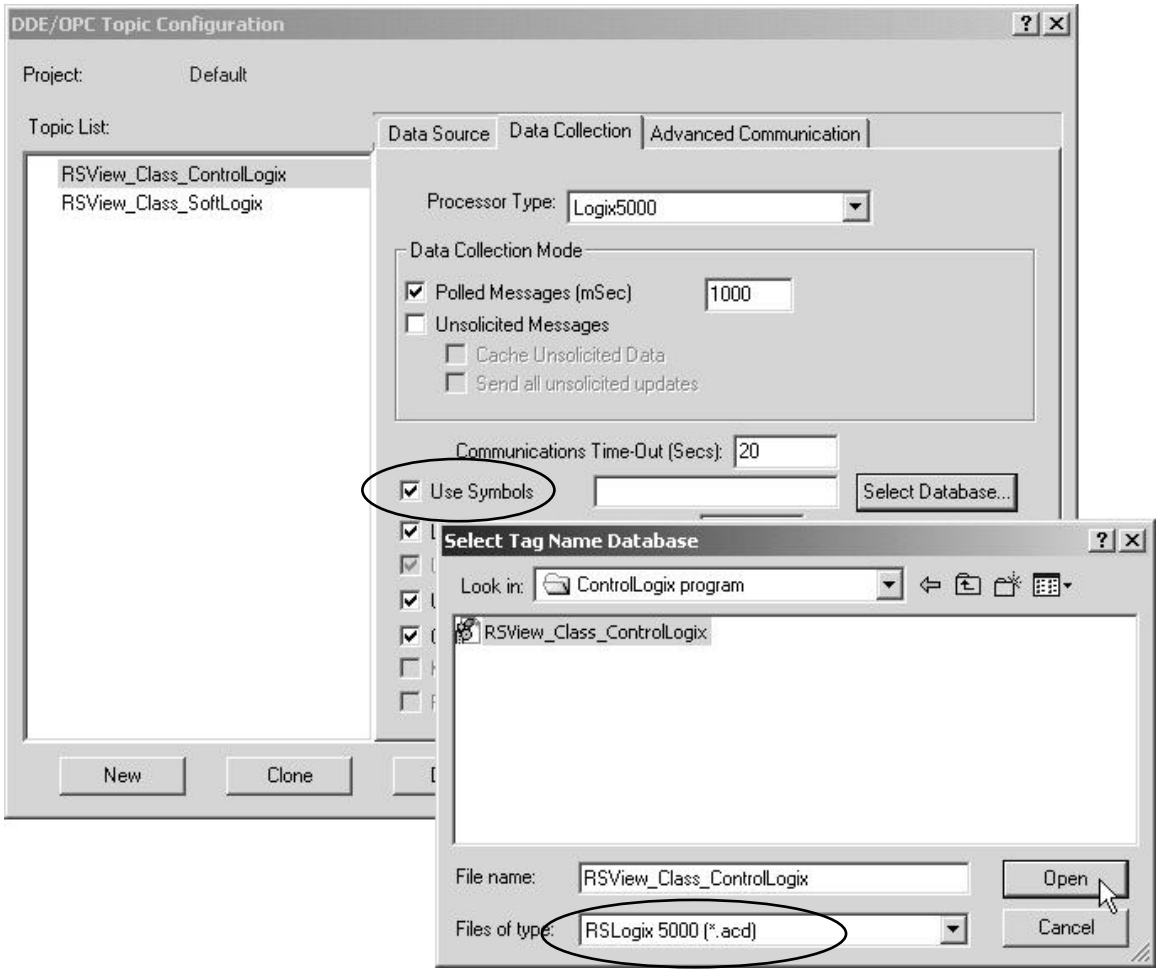
You will use the SoftLogix engine to get data into your project. If the classroom is equipped with a ControlLogix processor, you may also get data from that.

The controller should be already running the program **RSView_Class_ControlLogix** and be available to the student machines via ethernet.

1. Open RSLinx and configure an **Ethernet devices** driver. You will need to know the IP address of the 1756-ENET module. Use the **Ethernet/IP** driver if you are connecting to a 1756-ENBT module. Confirm the connection in RSWho.
2. Create an RSLinx topic to the ControlLogix processor. (Since you haven't downloading the program, one will not have been created automatically).
   - Right-click on the controller in RSWho. Select "Configure New DDE/OPC Topic"



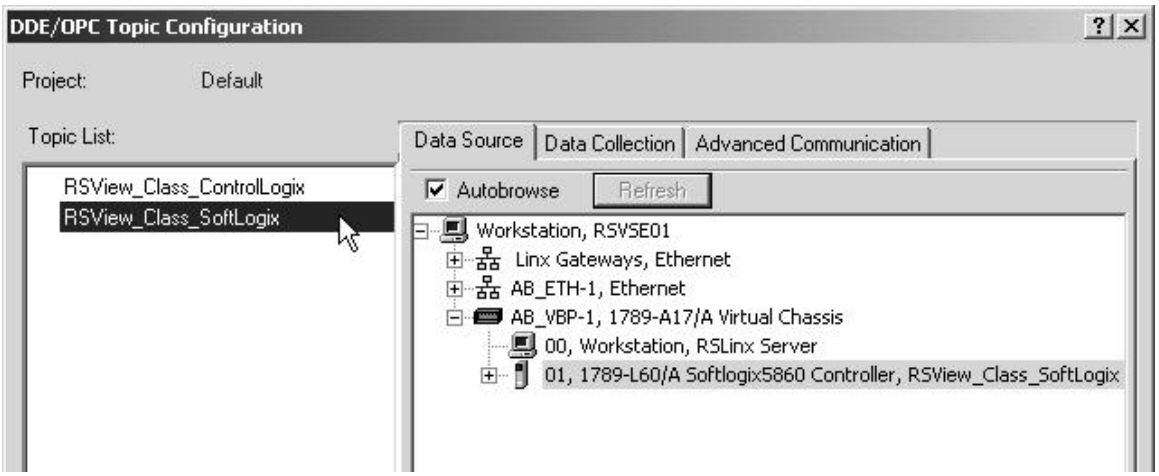
- The new topic will have the same name as the processor. Click on the **Data Collection** tab.
- Configure the topic to reference an offline logic file: Check the **Use Symbols** box. Navigate to the **RSView_Class_ControlLogix.acd** file.



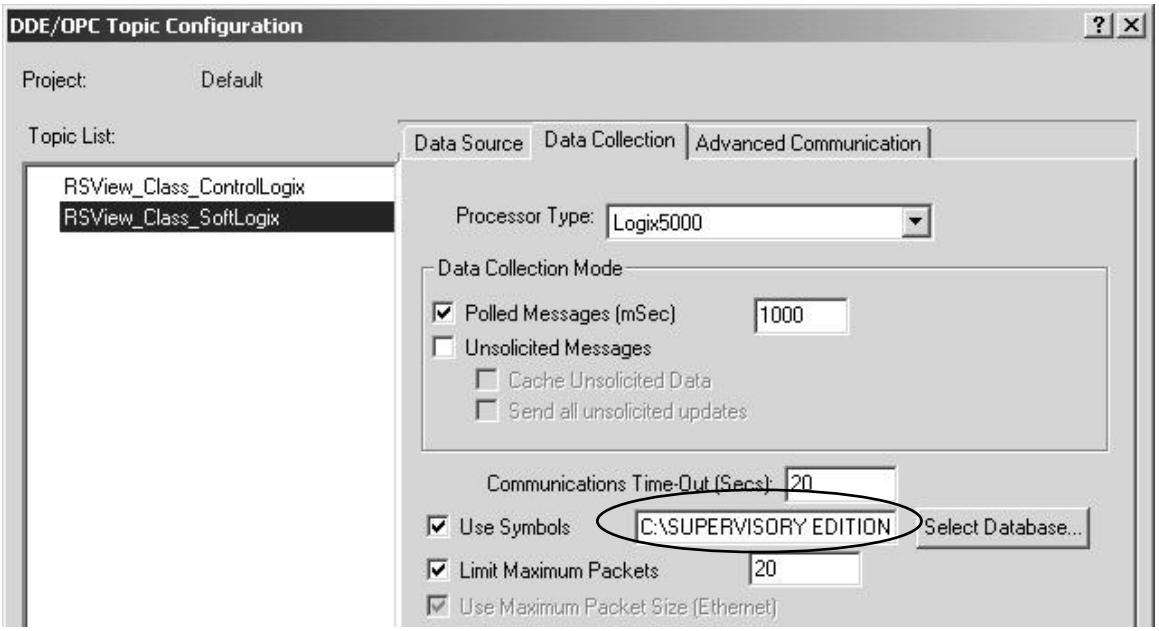
- Apply these changes and close the Topic Configuration dialog box.

Exploring RSLinx

1. Open RSLinx and select **Topic Configuration** from the **DDE/OPC** menu. The topic to the SoftLogix controller was created automatically by RSLogix.

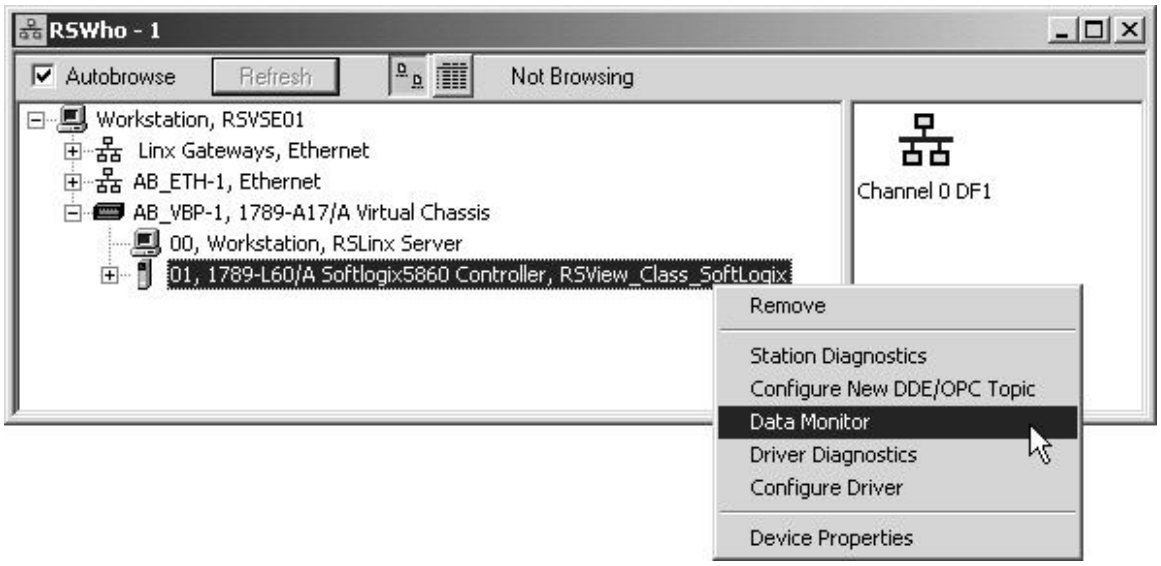


2. Click on the **Data Collection** tab. Note that the path to the offline RSLogix file has been automatically added. This allows for offline OPC browsing.

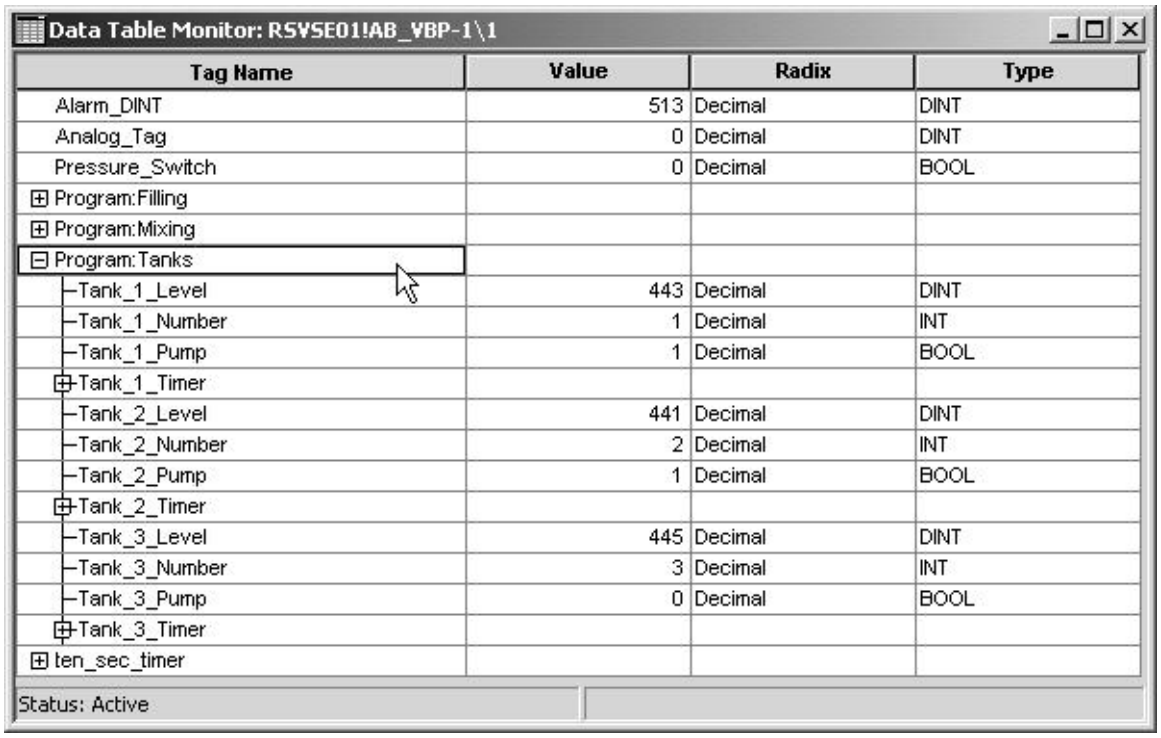


3. Click **Done** to close the window.

4. Click the **RSWho** window to bring up a graphical representation of your network. Expand the driver and find the SoftLogix processor. Right-click on the processor and select **Data Monitor**.



The Data Monitor allows you navigate through and see the data real-time in the processor.


Data Table Monitor: RSVSE01!AB_VBP-1\1
Tag Name | Value | Radix | Type
Alarm_DINT | 513 | Decimal | DINT
Analog_Tag | 0 | Decimal | DINT
Pressure_Switch | 0 | Decimal | BOOL
Program:Filling
Program:Mixing
Program:Tanks
Tank_1_Level | 443 | Decimal | DINT
Tank_1_Number | 1 | Decimal | INT
Tank_1_Pump | 1 | Decimal | BOOL
Tank_1_Timer
Tank_2_Level | 441 | Decimal | DINT
Tank_2_Number | 2 | Decimal | INT
Tank_2_Pump | 1 | Decimal | BOOL
Tank_2_Timer
Tank_3_Level | 445 | Decimal | DINT
Tank_3_Number | 3 | Decimal | INT
Tank_3_Pump | 0 | Decimal | BOOL
Tank_3_Timer
ten_sec_timer
Status: Active

Close the Data Monitor when you are done looking at it.

This Lab is Finished.

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3. *Creating An RSView SE Application*

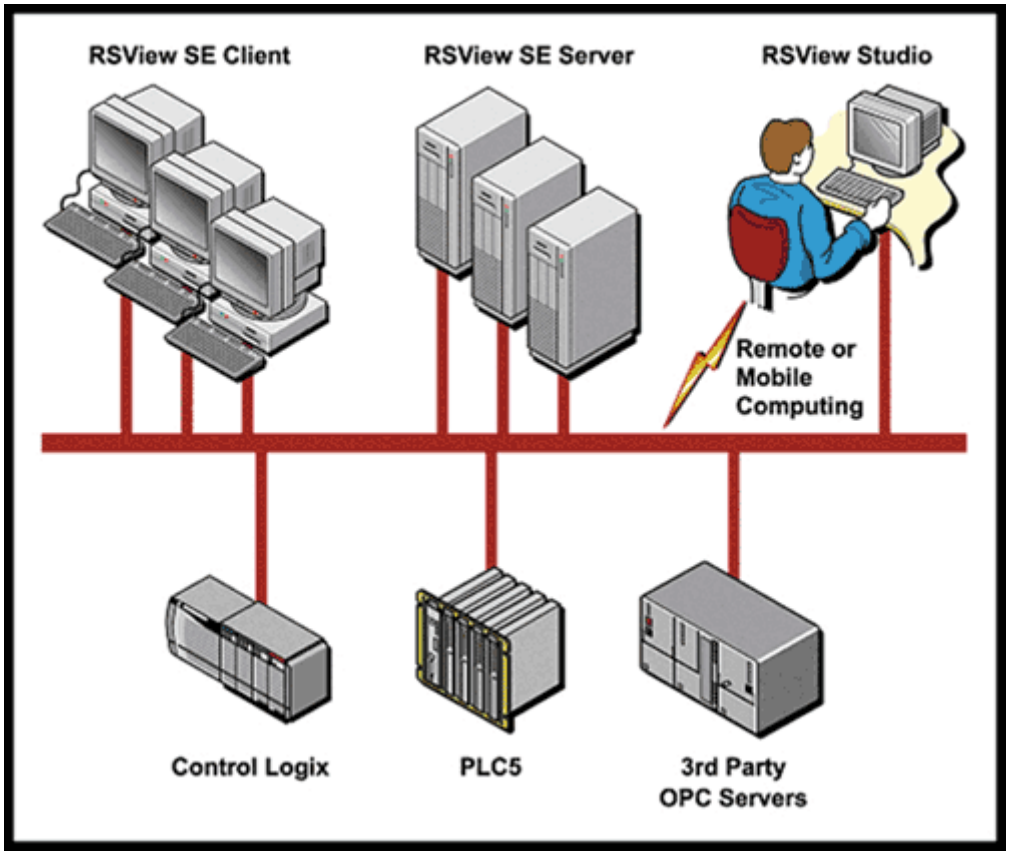
Objectives:

- Understand the architecture of RSView Supervisory Edition standalone and distributed applications
- Install the RSView SE Software components
- Set the FactoryTalk Directory for the application
- Create and application with RSView Studio
- Explore the RSView Studio software interface
- Configure Areas, HMI Servers and Data Servers
- Create a Standalone RSView SE Application

RSView SE - The Distributed Application

RSView Supervisory Edition supports multi-server and multi-client distributed applications.

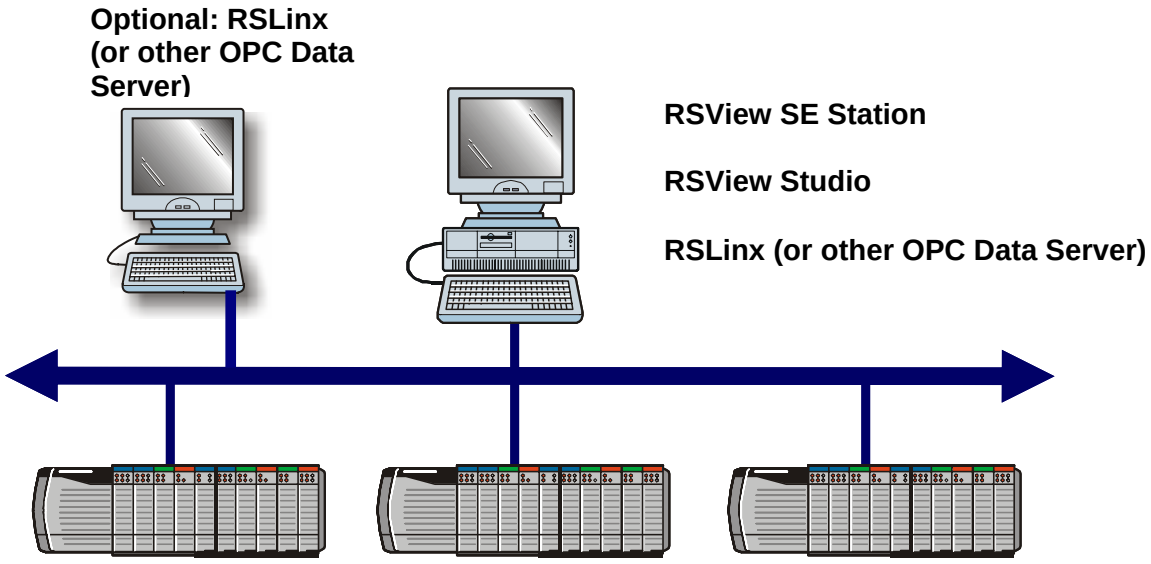
RSView SE Client is used to view and interact with the application. The HMI and Data Server components of the application are separate from the client. There is complete flexibility in placing servers and clients about the network. The application is configured with RSView Studio. These software components all reside on the same network.



All users in the distributed application must log into the same Windows Domain or Workgroup.

RSView SE - The Standalone Application

RSView SE Station is a runtime activation that bundles a server and a client together.



RSView Studio is required to edit the application. The editing functionality of SE Station is the same as with a distributed SE application.

RSView SE Station supports one HMI loaded on the local computer. Multiple data sources, local or remote, may serve data to the standalone application. Redundancy is not supported with the SE station license.

You may decide to expand the standalone HMI in the future, for distributed control or redundancy support. An RSView SE distributed application may import an SE Station standalone application. The HMI project does not have to be changed, as long as existing data references remain valid.

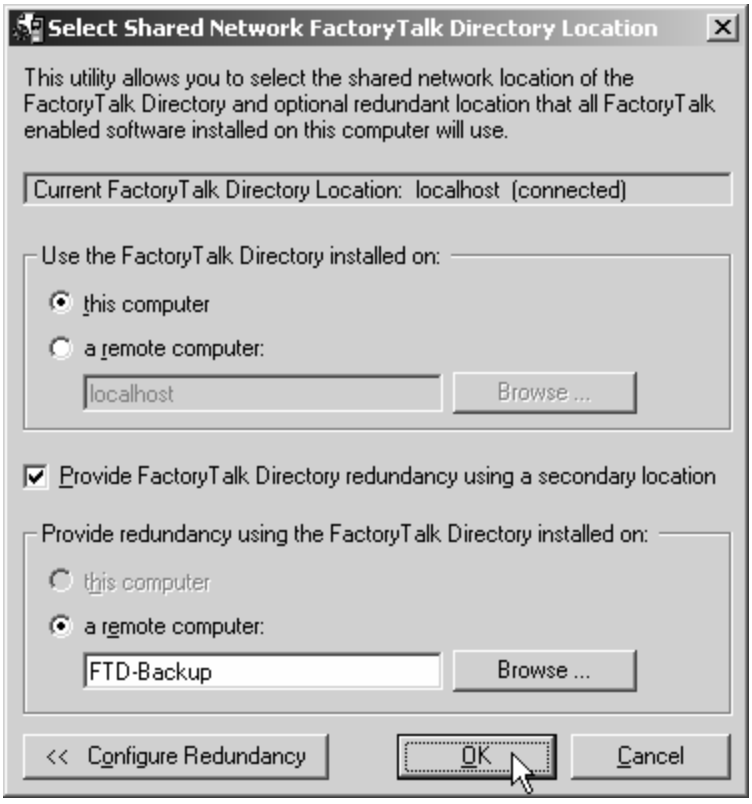
Creating an Application

The FactoryTalk Directory

Information about a distributed application resides in the FactoryTalk Directory. You must decide which computer on your network will be the FactoryTalk Directory, and then you must install the FactoryTalk Directory software on that computer. You will be prompted to specify the FactoryTalk Directory Server when you install RSView Supervisory Edition.

Note: This applies to a distributed application only. An RSView SE Station installation will automatically reference a local FactoryTalk Directory.

At any time you may use the **Specify FactoryTalk Directory Location** utility (Start, Programs, Rockwell Software, Utilities) to set the name of the computer on which the FactoryTalk Directory is installed. You must use the Specify FactoryTalk Directory Location utility on every computer on the network you want to have access to your applications.


Select Shared Network FactoryTalk Directory Location
This utility allows you to select the shared network location of the FactoryTalk Directory and optional redundant location that all FactoryTalk enabled software installed on this computer will use.
Current FactoryTalk Directory Location: localhost (connected)
Use the FactoryTalk Directory installed on:
this computer
a remote computer:
localhost
Browse ...
Provide FactoryTalk Directory redundancy using a secondary location
Provide redundancy using the FactoryTalk Directory installed on:
this computer
a remote computer:
FTD-Backup
Browse ...
<< Configure Redundancy
OK
Cancel

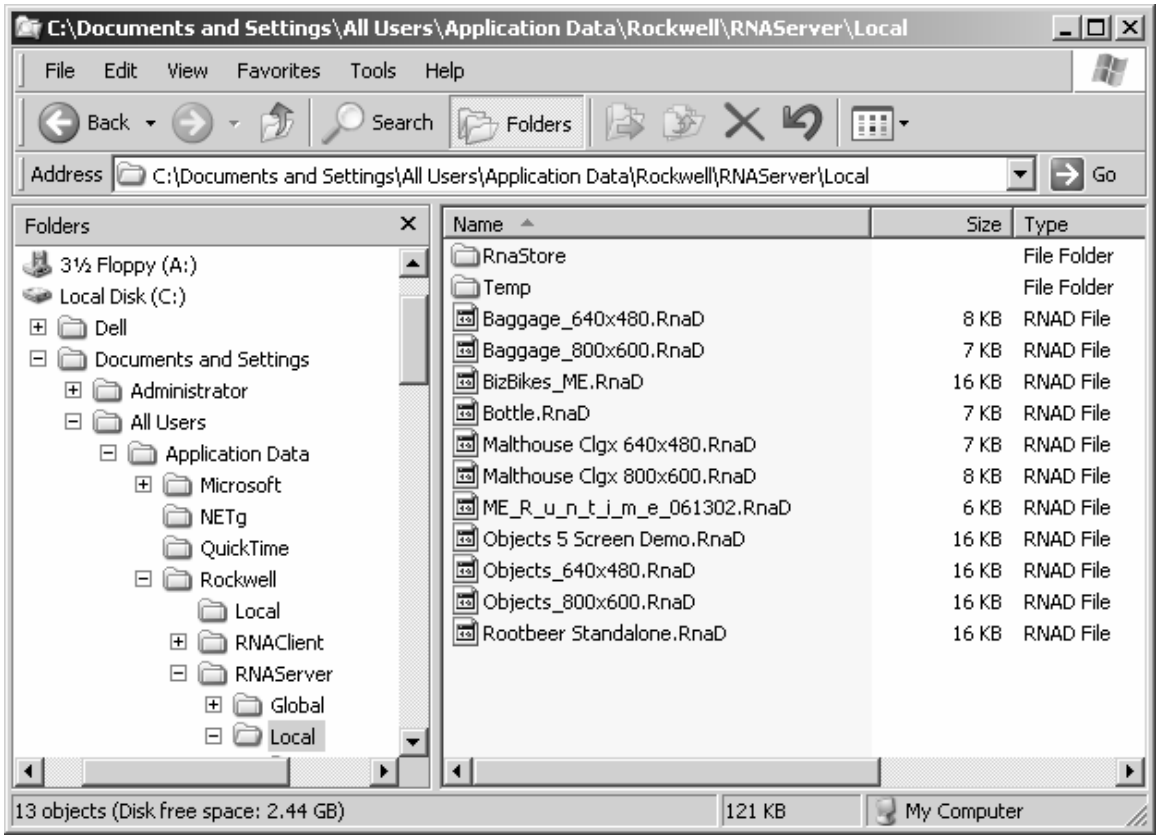
Browse and select the computer you wish to use as the FactoryTalk Directory. Redundancy will be covered in a later chapter.

The FactoryTalk Directory holds **application files**. These files have an **.rnad** extension, and contain the high-level information of an application - user security information and the location of the HMI and Data servers.

The application files are held in this path:

```
C:\Documents and Settings\All Users\Application Data\Rockwell\RNAServer\
```

SE Distributed application files are in the `\Global` folder. SE Standalone and Machine Edition application files are in the `\Local` folder.



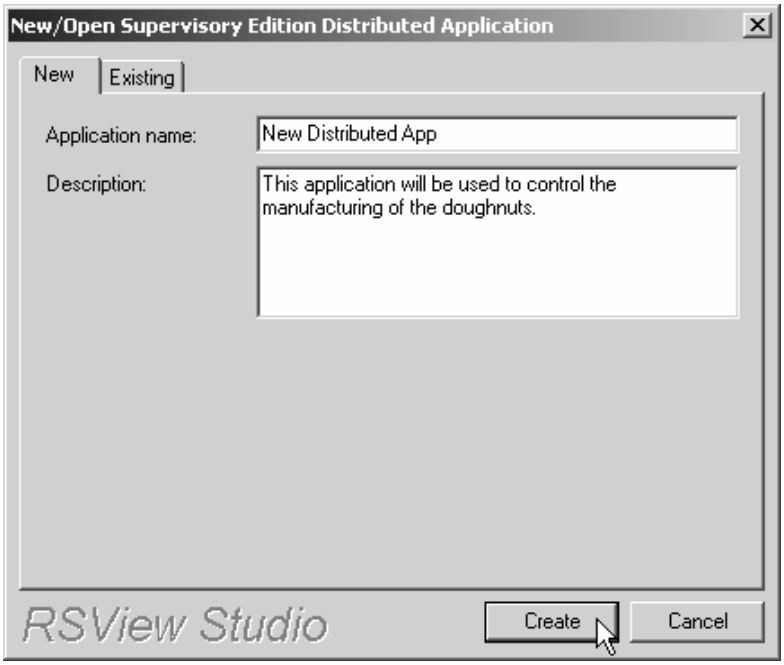
Client computers (those running SE Clients and RSView Studio) contain a locally cached copy of the application:

```
C:\Documents and Settings\All Users\Application Data\Rockwell\RNAClient
```

Open RSView Studio

An application is created in RSView Studio. Open the program (Start, Programs, RSView Studio). You must decide the scope of your project you will ultimately run. When you purchase RSView Supervisory Edition, you may also create SE Standalone or Machine Edition projects. RSView Machine Edition is outside the scope of this course.

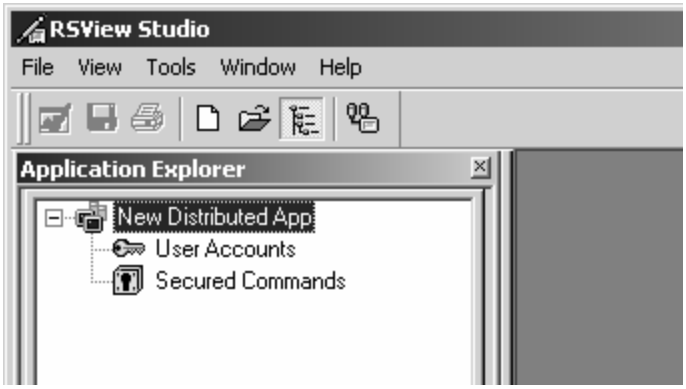
Create a new application from the next dialog box.



Navigating RSView Studio

You (and anyone on the FactoryTalk network) may start editing the application after it is created.

The Application Explorer window shows the name of the application. User Accounts and Secured Commands will be covered in a later chapter.



The View Menu

You can customize your work environment with the view menu. From here you can toggle the visibility of a number of items including the Explorer Window, the Activity Bar and the Status Bar. Workbook mode is toggled on and off from the **View** menu. Toolbars are also shown or hidden with the **View** menu.

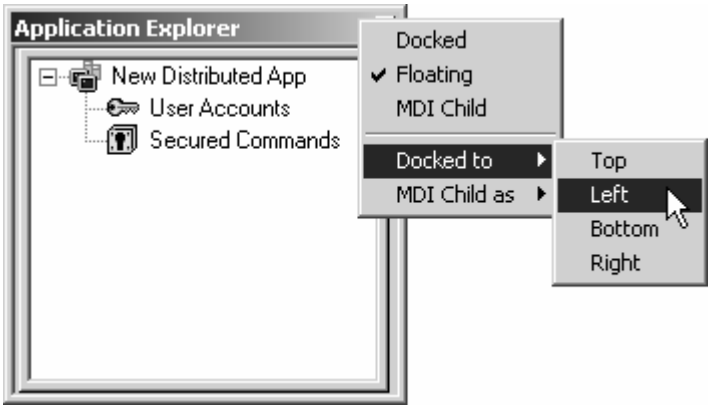
The Application Explorer will contain all the elements of the distributed application. The window can be shown and hidden from the **View** menu. It may be displayed in different ways. To change how it looks, right click in the title bar.

The choices are docked, floating or MDI (Multiple Document Interface) child.

You may dock the Project Explorer to any side of the RSView Studio workspace.

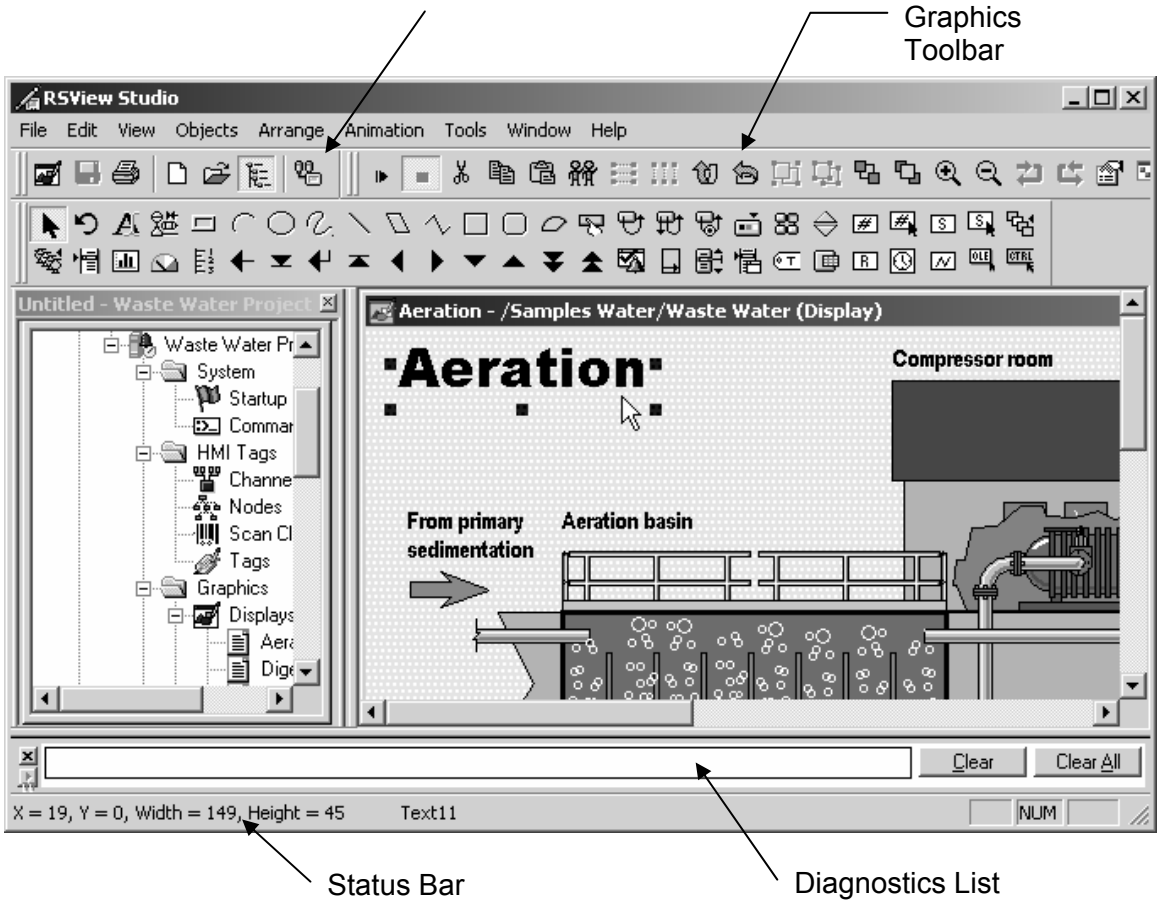
Floating allows you to move the Project Explorer anywhere in the display by clicking and dragging in its title bar.

With either of these options the Project Explorer remains on top of all windows. To force it to act as any other window, select MDI Child. It is now listed in the Windows menu item and can be minimized, maximized and given focus like any other open window.



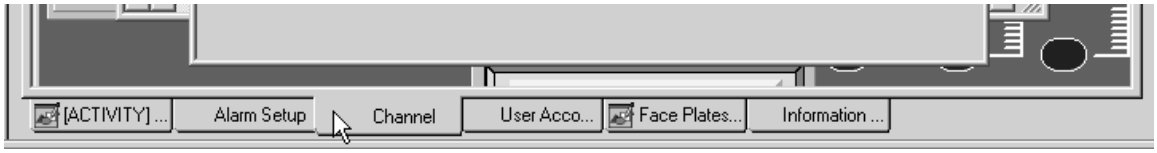
The Status Bar

The Status Bar gives general information on the active window or object selected. In the example below, the position, size and name of an object is displayed.



Workbook Mode

Selecting Workbook Mode in the **View** menu displays tabs at the bottom for each graphic display and/or editor that you have opened from the Project Explorer. This can speed up the navigation of many open windows – just click on the tab to bring the corresponding window to the front.



Building a Distributed Application

Your distributed application may organized into distinct Areas, containing HMI Servers and Data Servers.

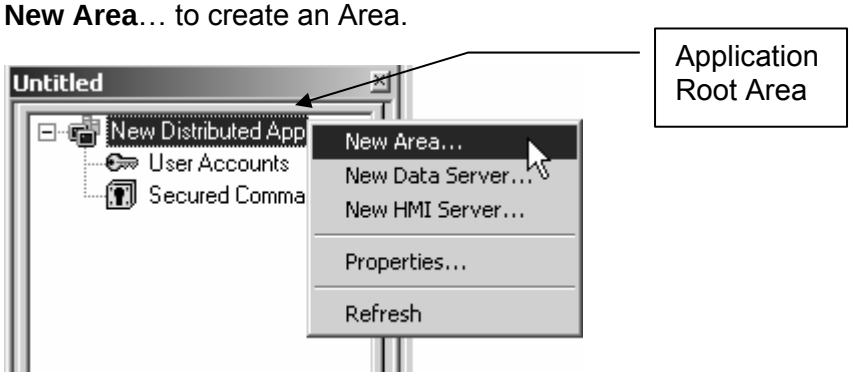
Areas

Areas allow you to divide an application into manageably-sized, logical parts, or to organize the application in a way that makes sense for the process you are controlling. Areas do not apply to standalone applications.

An area might represent a portion or stage of a process, or a region within the process facility. For example, an automotive plant might be divided into areas called Press and Fabrication, Body Shop, Paint Shop, Engine and Transmission. A bakery might be divided into areas called Ingredients, Mixing, Baking, and Packaging.

Alternatively, a plant with identical production lines might be divided into areas called Line 1, Line 2, Line 3, and so on. This Preface would allow you to add new, identical production lines to the application by copying HMI server projects into new areas.

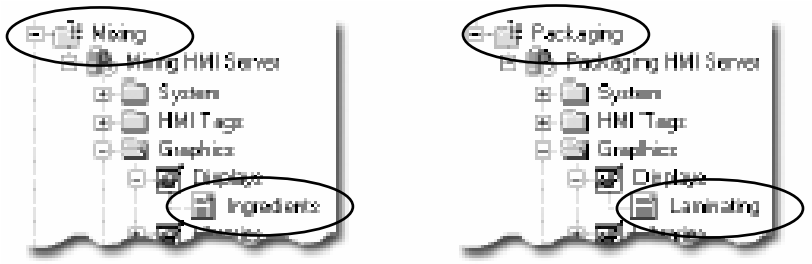
Each area can contain one or more sub-areas, and one or more data servers. Each area or sub-area can contain only one HMI server. Right-click on the root project and select **New Area**… to create an Area.



All applications have one system-defined area called the **application root area**. The application root area has the same name as the application, and contains the User Accounts and Secured Commands lists. You can use the application root area like any other area, for example to contain an HMI server, or one or more data servers.

The **home area** is the area in which an application component is located. When you refer to an application component, but don't specify the area in which the component is located, RSView uses the home area to locate the component.

For example, if two graphic displays are located in different areas, each has a different home area.



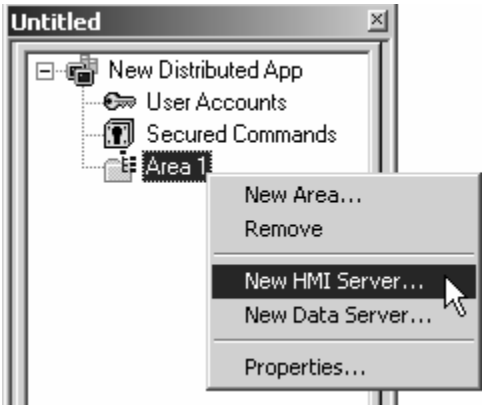
In this example, the graphic display called Ingredients is in an area called Mixing. The graphic display's home area is Mixing. The graphic display called Laminating is in an area called Packaging. The graphic display's home area is Packaging.

HMI Servers and HMI Projects

HMI servers are software programs that supply information to clients when they request it. HMI servers have no user interface. Once installed, they run as a set of Windows services. HMI servers store HMI project components (for example, graphic displays), and serve these components to clients. Each HMI server also manages a database of tags, and performs alarm detection, and historical data management (logging).

HMI projects contain displays, data log models, alarms, HMI tags and other services. HMI projects are loaded on HMI servers.

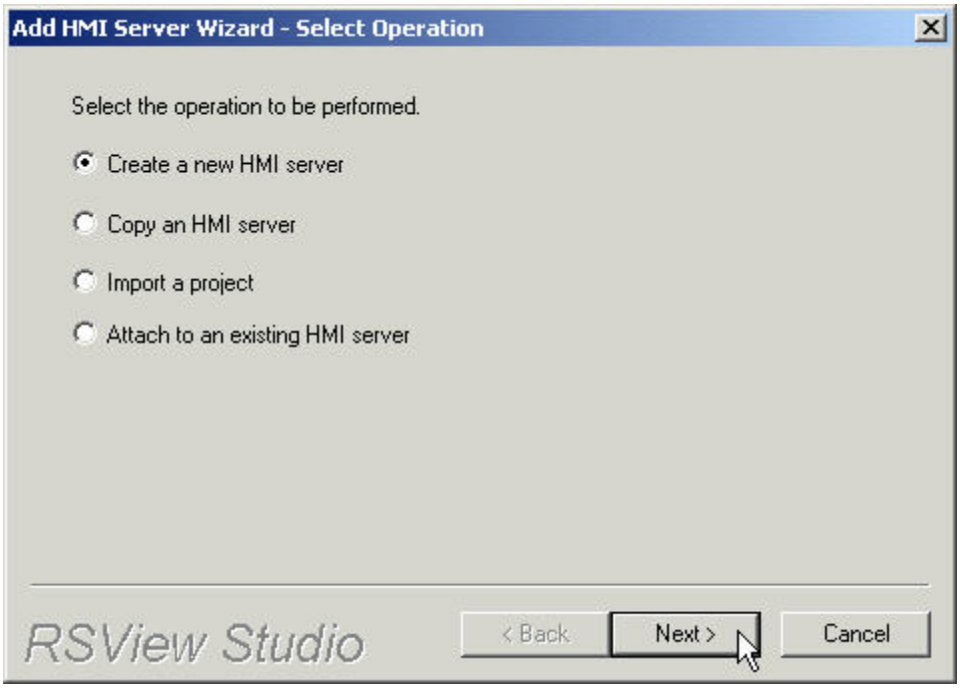
Each Area may contain one HMI Server. Right-click on an Area (or the root Area) and select **New HMI Server…** to create a new HMI Server.



Creating an HMI Project

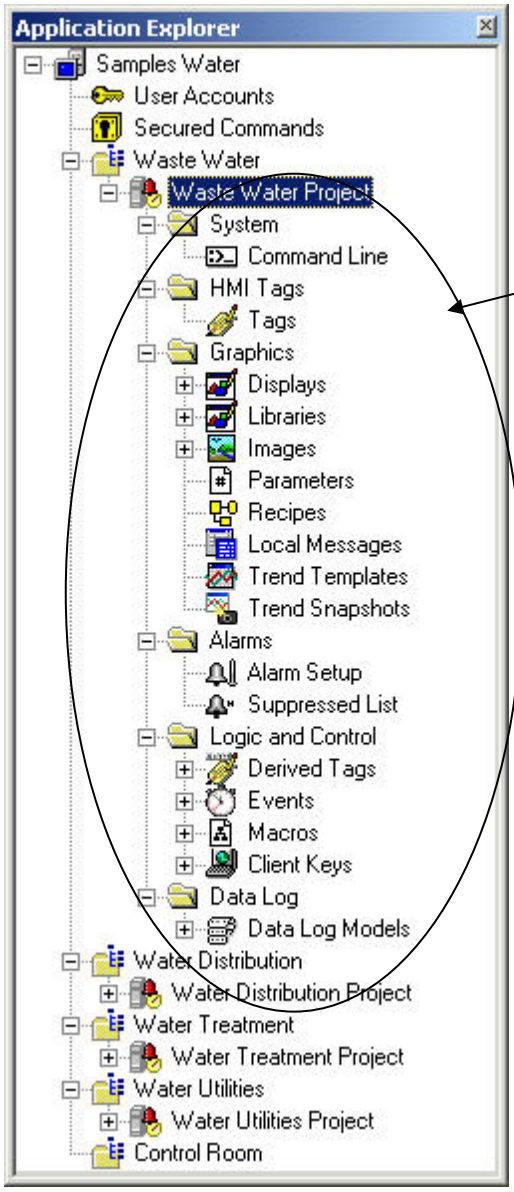
There are three options for including an HMI Project in the newly created HMI Server.

1. Create a new HMI project
2. Copy an existing HMI project from another SE server.
3. Import an existing RSView32, RSView SE or RSView ME HMI project.
4. Reference, but not copy, an existing SE HMI project.


Add HMI Server Wizard - Select Operation
Select the operation to be performed.
Create a new HMI server
Copy an HMI server
Import a project
Attach to an existing HMI server
RSView Studio
< Back
Next >
Cancel

When you create a new HMI project you give it a name and specify the computer that it will reside on.

The HMI Project



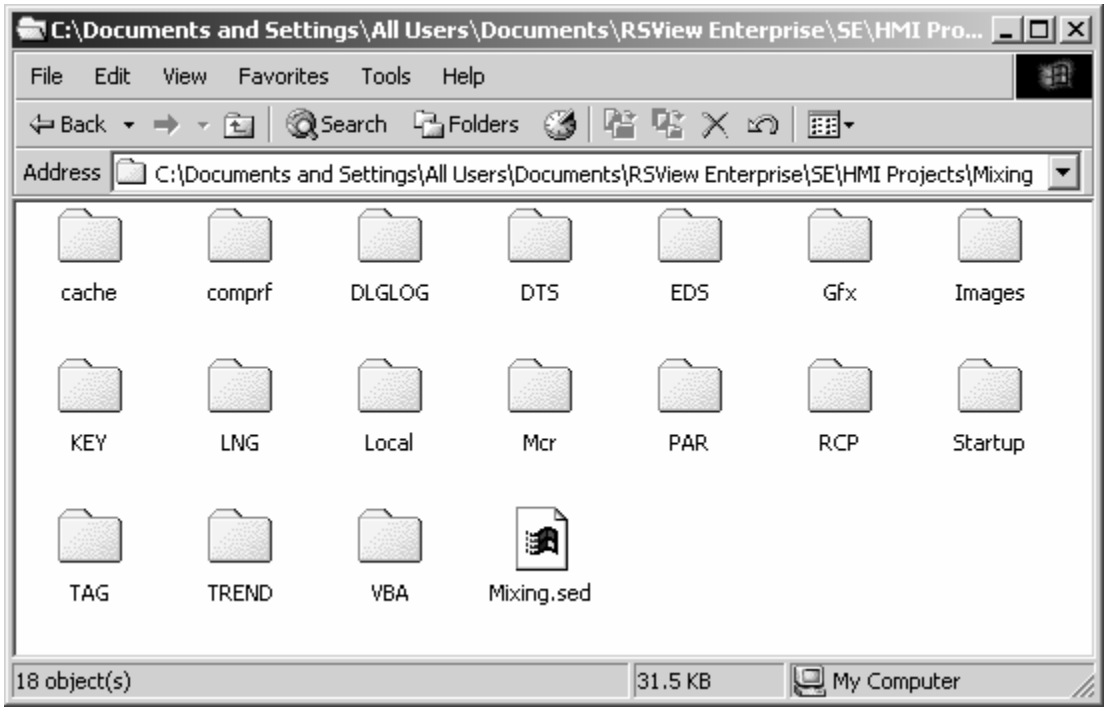
A distributed SE application containing (4) Areas, each with an HMI Server.

The HMI project contains HMI tags, graphics, trends, alarms, data log models – all the operator interface elements. These will all be covered in detail in later chapters.

Creating an HMI Project will create many files and folders on the hard drive of the computer that you specified to be the HMI Server.

All HMI Projects are collected in the directory:

```
C:\Documents and Settings\All Users\Documents\RSView
Enterprise\SE\HMI Projects
```

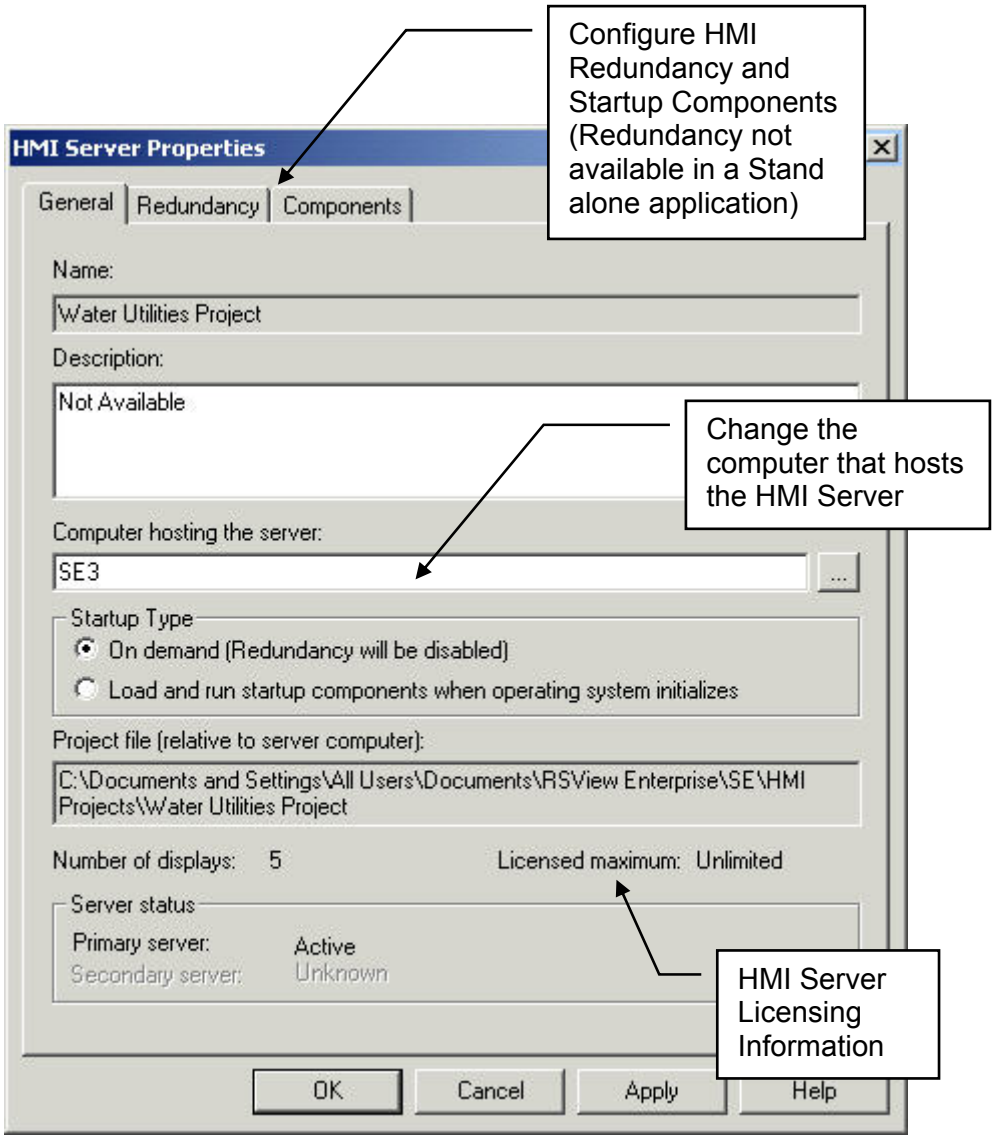


If you are developing an application on a computer and wish to deploy it on a different computer, you must change the HMI Server location.

Before you change the computer that will act as the HMI Server, you must first move these HMI Project files to the new computer. Then specify the new computer in the HMI Server properties (see next page).

HMI Server Properties

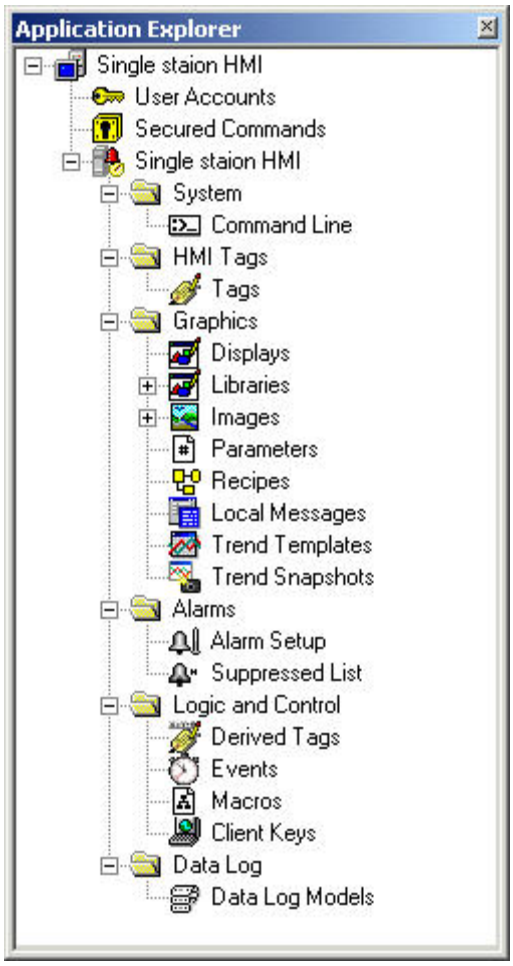
Certain properties of an HMI Server can be viewed and changed after it's created. Right-click on the HMI Server and select **Properties**.



Building a Standalone Application

You create a standalone application in RSView Studio to run with an RSView SE Station license.

Standalone applications consist of one HMI Server. No Areas are used.



The HMI Project created in a standalone application may be imported into a distributed application at a later time.

Communicating with a processor

There are two basic ways of establishing communications with a processor.

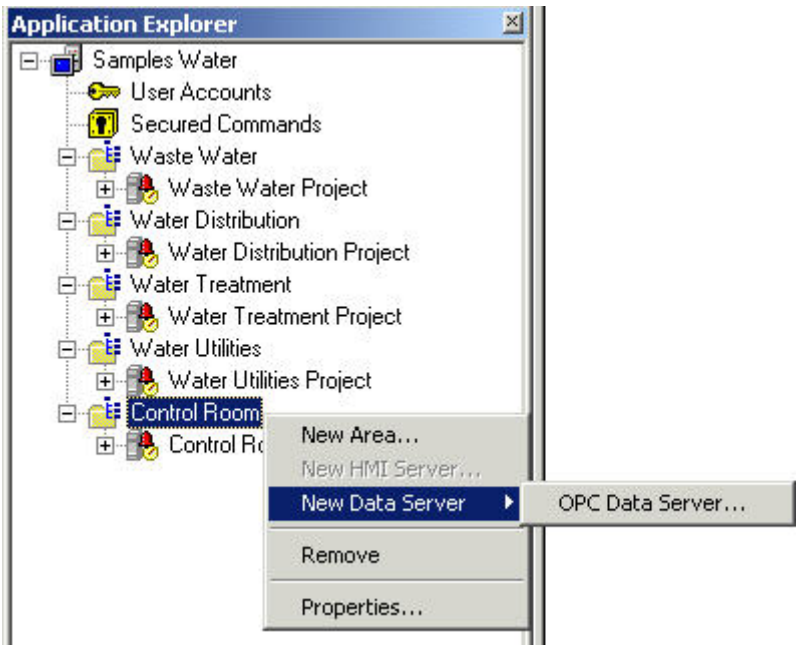
1. Data Servers – Create a Data Server in an Area (or at the root) of your SE application. Associate the data server with a local or remote OPC server. A data server provides client computers with data such as:
   - programmable controller values
   - OPC tags, and their value or status information
   - named variables in a ControlLogix processor

   Data servers enable the direct referencing of processor data without using a static tag database. This is a more efficient way of getting data to a client - data does not go through the HMI server at all.

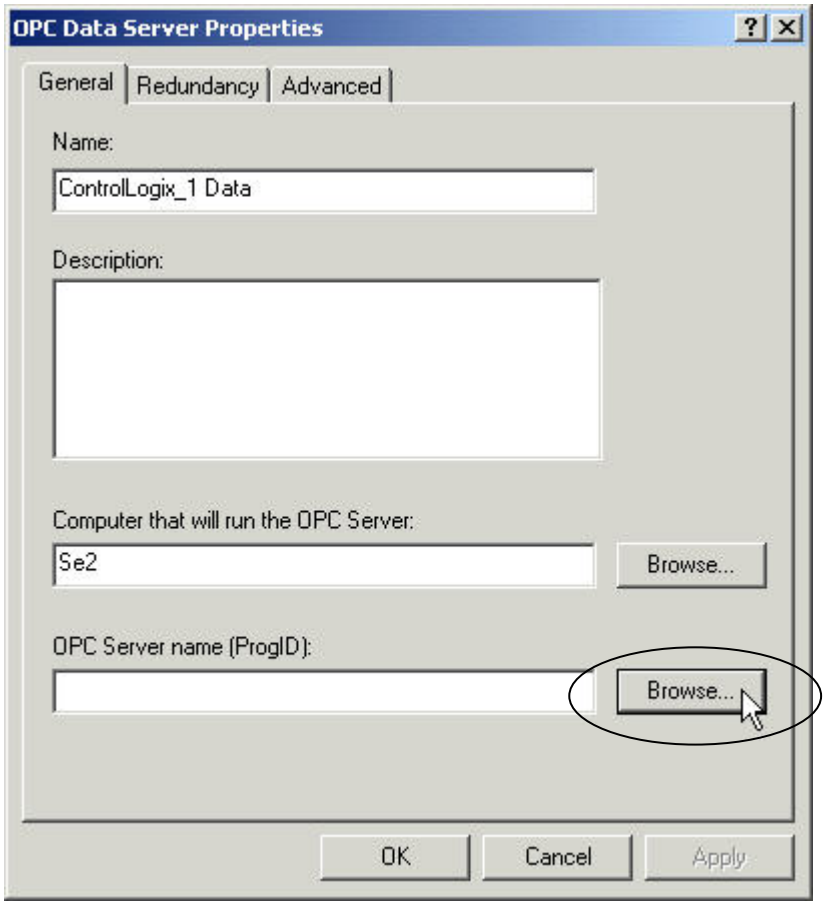
2. HMI Tags – Use the communication editors within an HMI Project to configure communications with a processor. Create HMI tags in the Tag Database Editor to reference data in a PLC. It is necessary to create HMI tags to implement alarming and security. This method will be covered in chapter 4.

Creating and configuring a Data Server

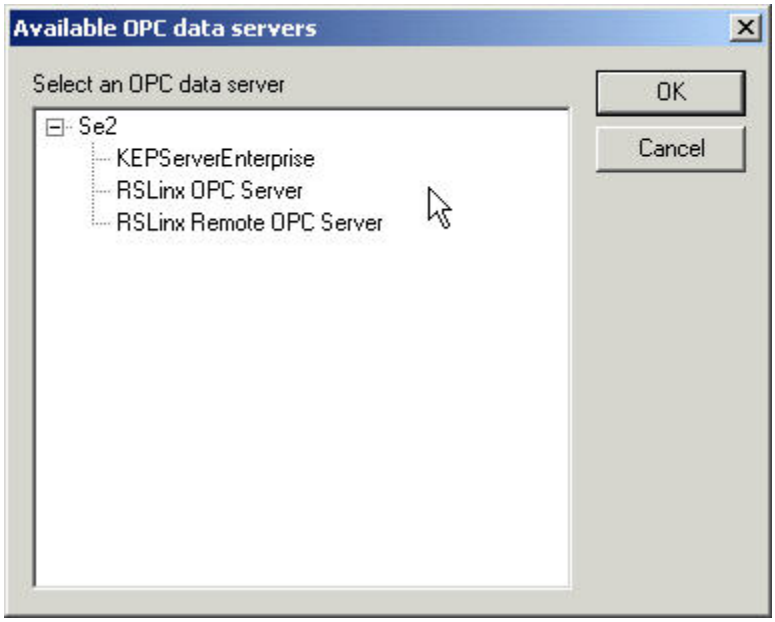
Right-click on an Area (or the root of the application) and select **New Data Server**. Multiple data servers may be assigned to an Area.



Configure the data server properties. Specify the computer that will run the OPC server. Associate the server with an OPC Server by browsing for it:

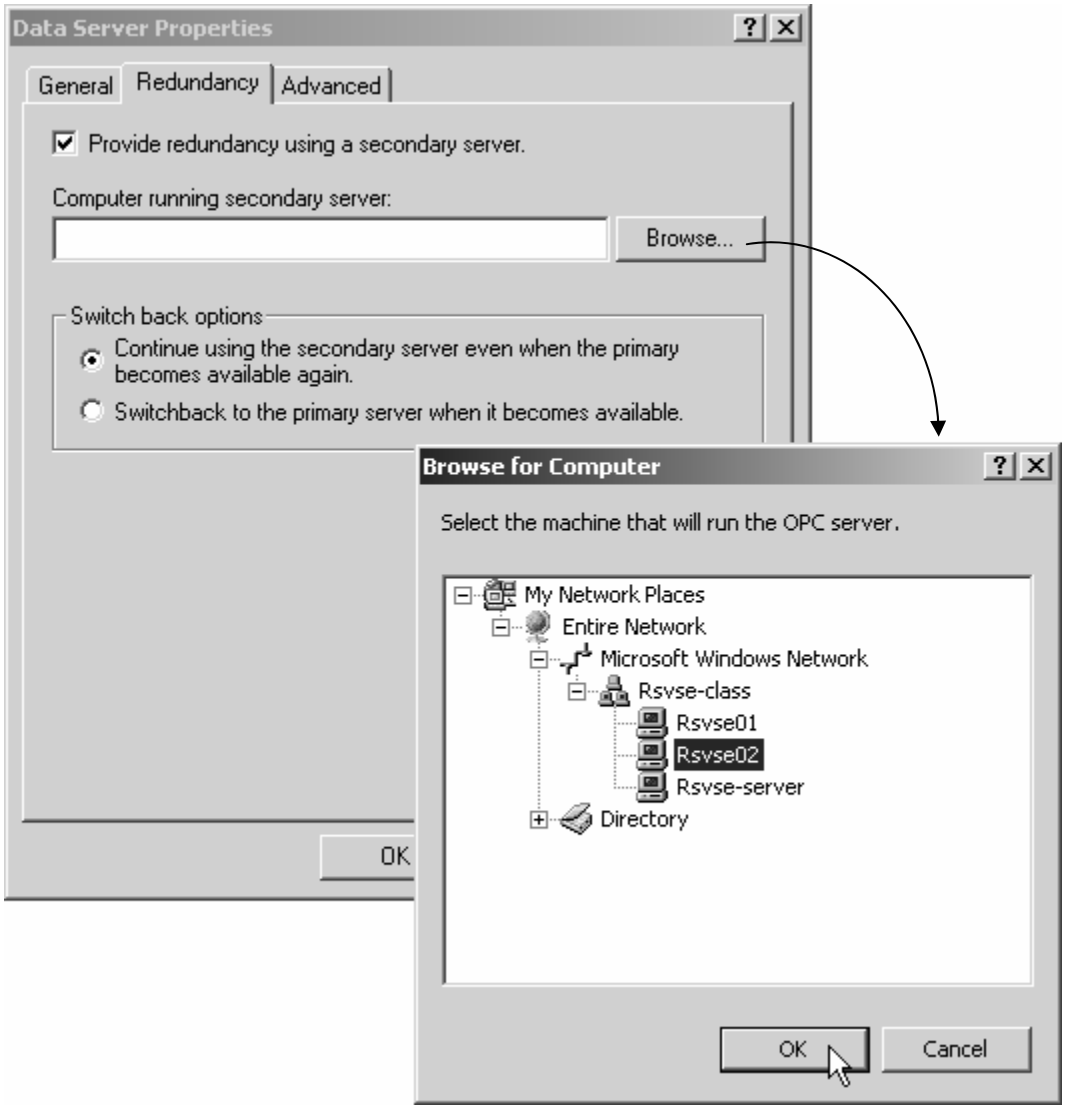


All installed OPC servers will populate the list. Choose the one you want to use.



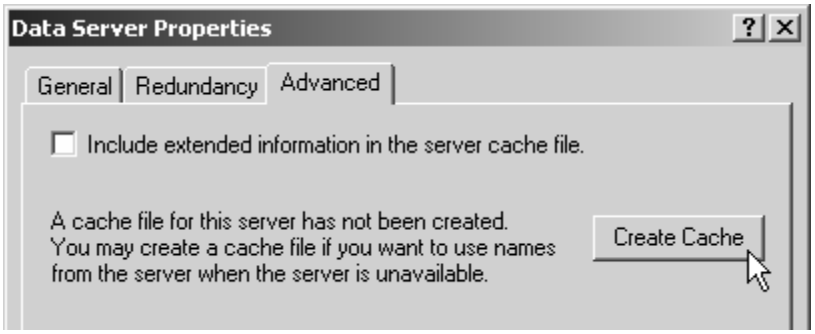
Data Server Redundancy

One advantage to using Data Servers is the ability to specify a backup computer running a second OPC server. All references through the data server will automatically switch over if the first data server is lost.

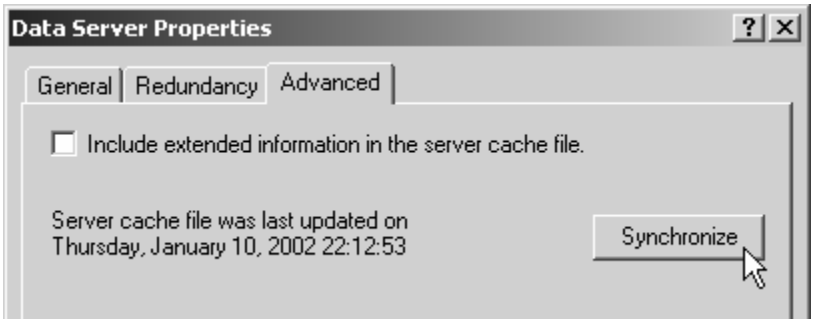


Data Server Advanced Properties

You may create a cache file of the data server. This will allow you to browse the data server tag information when the server is offline. Including extended information (tag data types) will increase the time to create or synchronize the cache.


Data Server Properties
General
Redundancy
Advanced
Include extended information in the server cache file.
A cache file for this server has not been created.
You may create a cache file if you want to use names
from the server when the server is unavailable.
Create Cache

Manually update the cache file to reflect any changes in the data server by synchronizing it.



Lab 2 – Create a Standalone SE Application

Objective: Work in a single computer environment to create a standalone SE application. You will:

- Install the RSView SE Software components
- Create a new SE standalone application
- Explore the HMI Project
- Create a data server to access controller data.

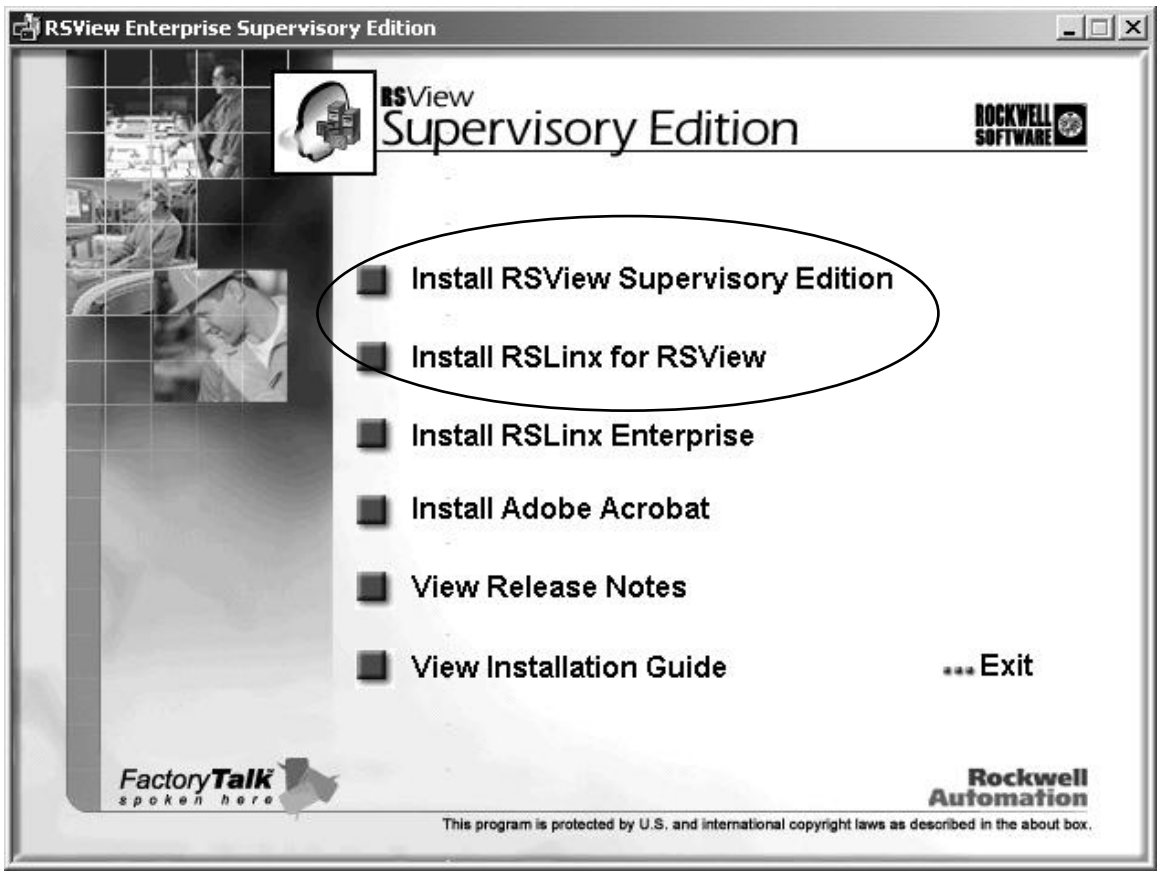
Software Requirements:

- RSView Studio
- RSLinx
- SoftLogix 5860 running the **RSView_Class_SoftLogix** program
- Optional - ControlLogix running the **RSView_Class_ControlLogix** program

Note: Later in the course you will combine your work with others to create a distributed application. At that time you will create Areas and HMI Servers.

1. Install the RSView SE components

There are many different components of RSView Supervisory Edition. Run the setup.exe program (\Software Installs\RSView SE directory)



The first two items, RSView for SE, and RSLinx for RSView, are necessary for our labs.

RSLinx is already installed on your system - check to see if it is running in the system tray.

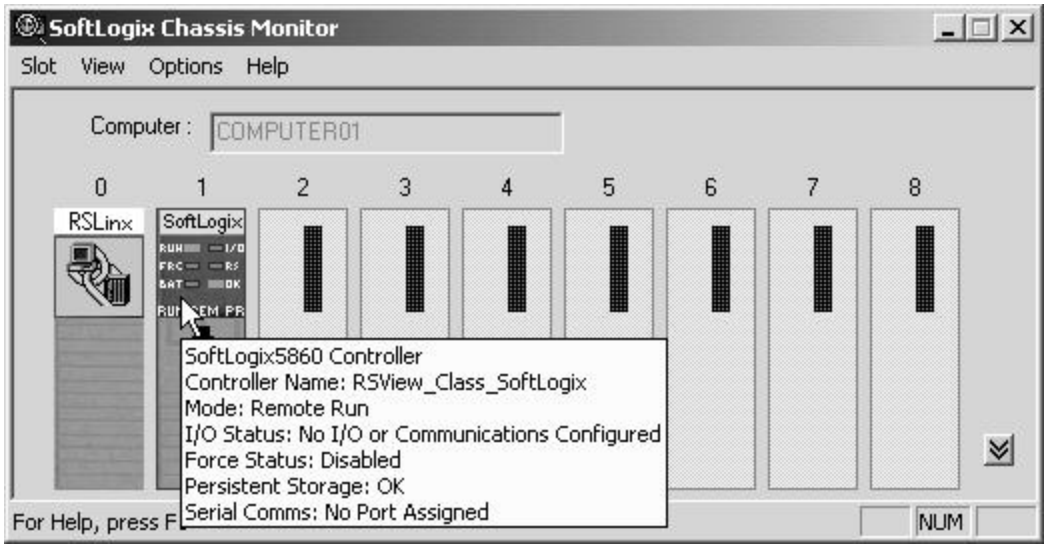
RSLinx Enterprise is used for RSView Machine Edition only in release 3.0. Do not install it.

- Install RSView Supervisory Edition with the default options. This will do a complete install of all SE components:
    - RSView Studio
    - SE Server
    - SE Client
    - Administration Console
    - FactoryTalk Directory
    - Samples
    - RSI Utilities

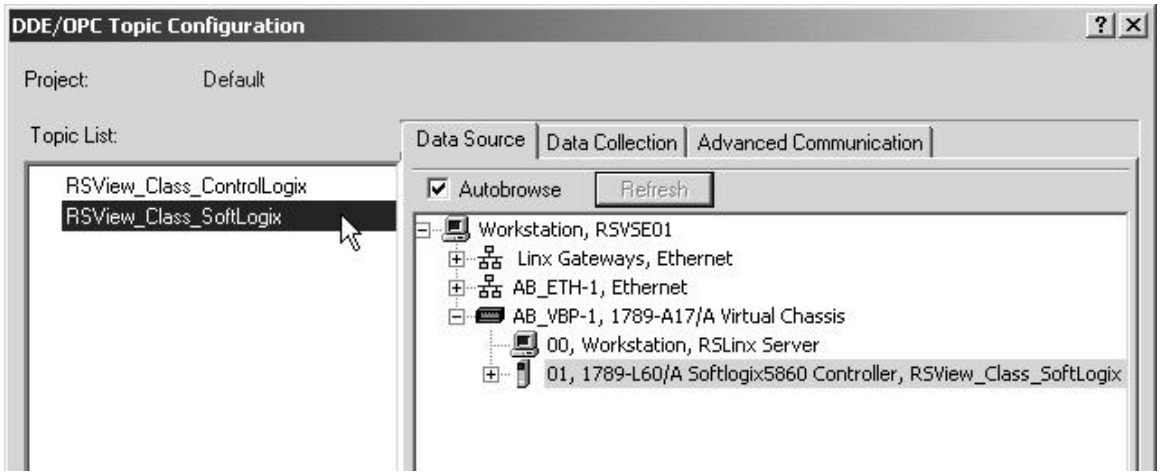
2. RSLinx and SoftLogix

- Confirm that the program from Lab1 is running in the SoftLogix processor. Click on the SoftLogix icon in the system tray of your computer:

- The SoftLogix Chassis Monitor window is opened. Bring up the tooltip information by hovering the mouse over the processor:



- Open RSLinx and confirm that the **RSView_Class_SoftLogix** topic (created in Lab 1) exists. Select **Topic Configuration** from the **DDE/OPC** menu.



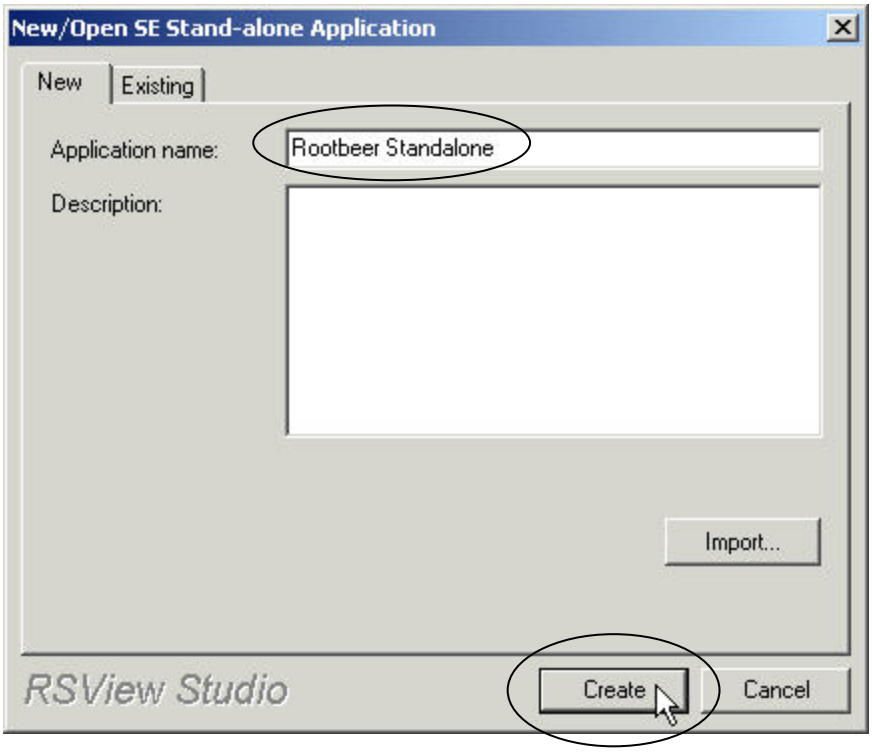
- Notify your instructor if there are any questions about your SoftLogix / RSLinx setup.

3. Create the Application

- Open RSView Studio (Start, Programs, RSView Studio).

- Select **SE Stand-alone** and click **Continue**.

- Give the application a name. Make it unique, so you can identify it later on. Use your name, ex: **Jim Standalone App**. For this manual, the application will be named **Rootbeer Standalone**.

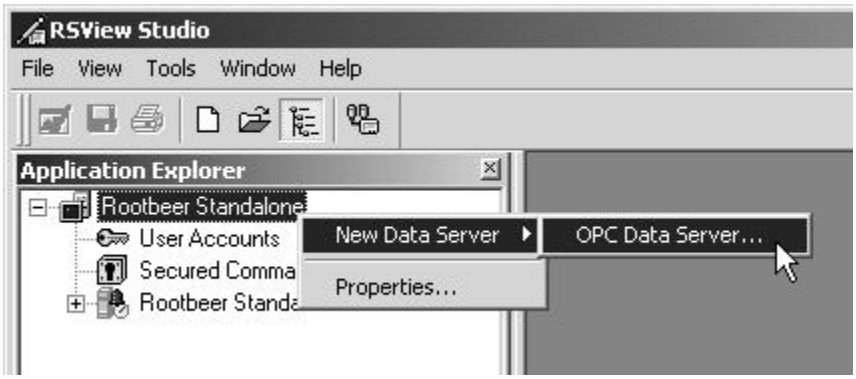


The basic structure of the standalone application is created:

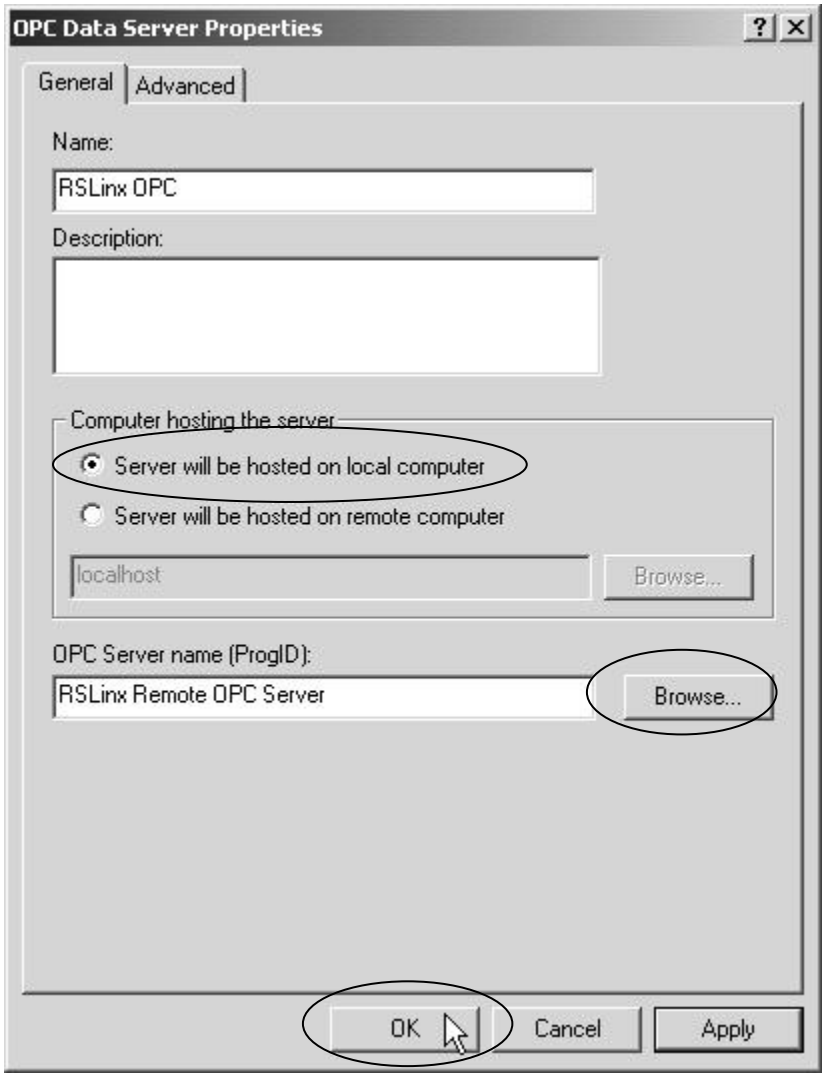
4. Create a Data Server

Create a Data Server within the application to reference the RSLinx OPC Server. This is how the SoftLogix (or ControlLogix) tags will be directly referenced.

- Right-click on the root of the application and select **New Data Server, OPC Data Server**.

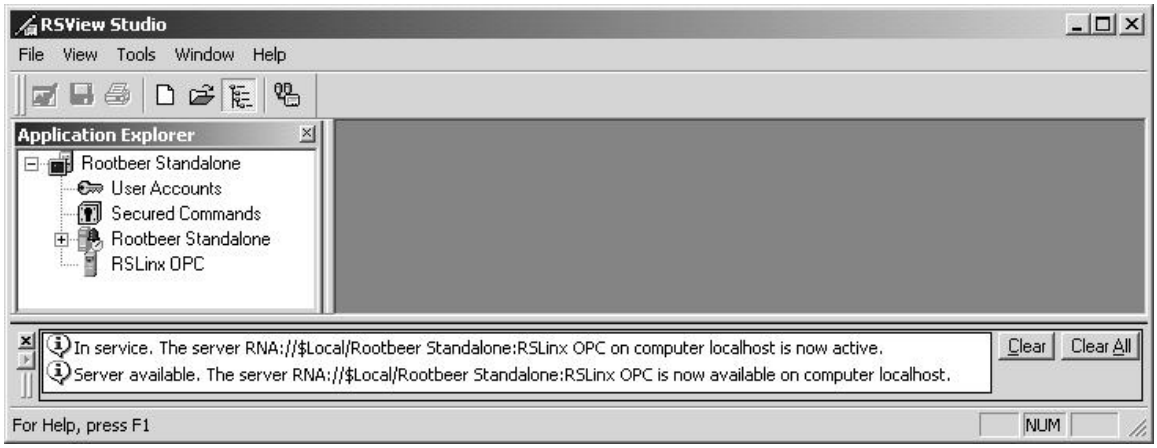


- Keep the computer setting to your local computer. Browse for the **RSLinx Remote OPC Server**. (The remote part will come when you combine



- Click **OK** to close the Data Server configuration.

The Application should look like this:



Note the messages in the Diagnostics List at the bottom of RSView Studio confirming the active data server.

This Lab is Finished.

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4. *Communications*

Objectives:

- Understand the difference between communicating to a processor by directly referencing a Data Server and by using HMI tags
- Understand when HMI tags are required
- Build an HMI Tag Database

Communicating with a processor

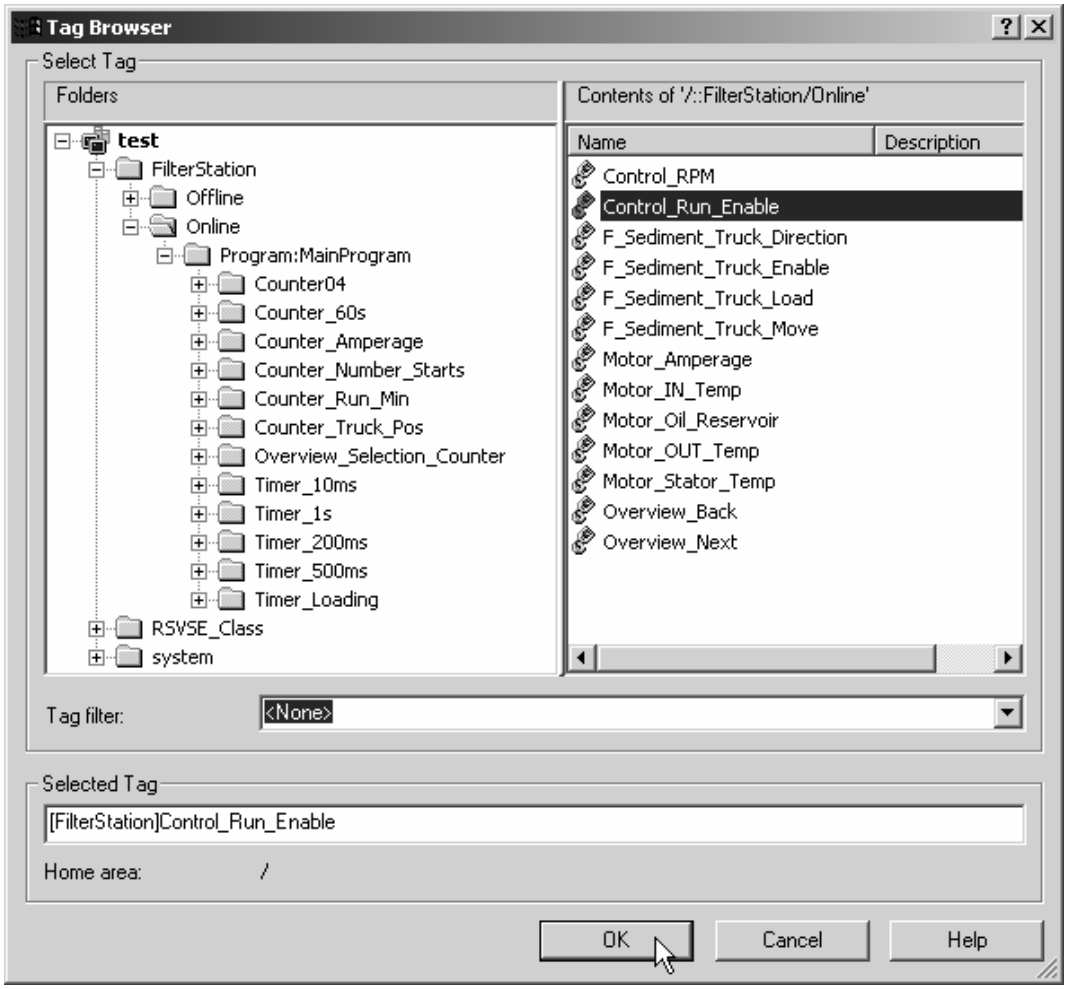
In Chapter 3 you learned how to create a Data Server as part of a distributed application. This chapter gets into greater detail with that topic, and introduces HMI tags as another way of communicating with a processor.

Directly Referenced Tags

RSView Supervisory Edition introduces the concept of "Tagless HMI". This simply means that you no longer need to create an HMI tag database to get at the value of a data point in a processor. Associating a Data Server with an OPC Server allows you to directly browse the processor to reference a tag.

For example, a program called FilterStation is running in a ControlLogix processor. RSLinx is used as the OPC server. A topic is set up in RSLinx to point to the ControlLogix processor.

When you need to use the value in the processor (to display the value in a graphic, for instance), you initiate a Tag Browser, and select the tag directly while online.



See page 5-21 for more information on using the Tag Browser.

Directly referencing the processor tag values requires an OPC server. RSView conforms to the OPC Data Access (DA) 2.0 specification for information exchange among automation or control applications, field systems or devices, and business or office applications.

RSView provides direct access to the basic set of attributes of all OPC-DA-compliant tags. The OPC-DA specification calls these tags 'data items'. In RSView, you access OPC-DA-compliant tags through the data server. The tags you access through a data server are called data server tags.

Using Directly Referenced Tags

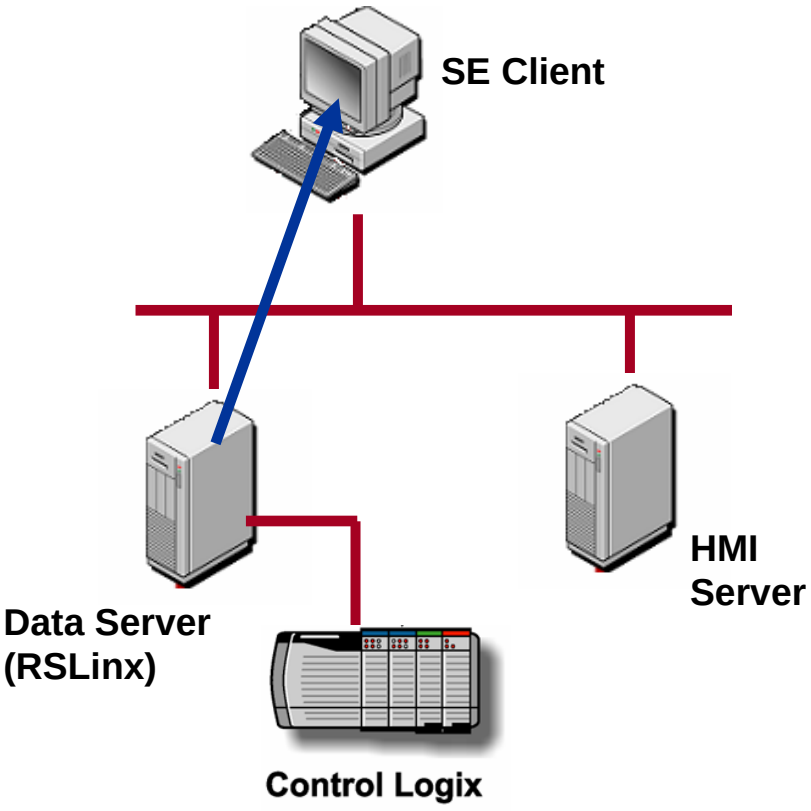
Use directly referenced data server tags whenever you need to access a value from the controller, and you don't need to attach alarming or security, or need to manipulate the value of the tag.

Using data server tags allows you to add, modify, or delete tags in a device without having to duplicate the changes in RSView's HMI tag database. It allows you to browse a tag in a controller as opposed to creating a static database.

Data server tags allow access to complex data types. Some devices, for example ControlLogix processors, support complex data types such as arrays and structures. Your controller might have structures that contain hundreds of member elements. Referencing tag values directly eliminates the need for creating one HMI tag for each member and creating additional HMI tags every time you create a new instance of a data structure in your controller

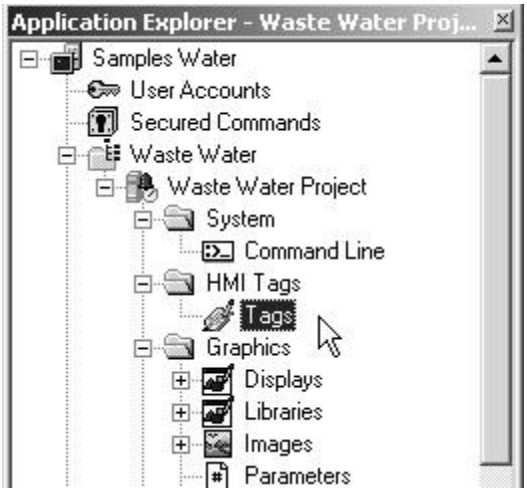
An additional benefit of directly referencing tags is the efficiency achieved in bypassing the HMI server. The OPC server serves its data to the client. The HMI does not have to process the information. This resolves to less network hops in a distributed environment.

In the diagram below, tag information from the ControlLogix is served directly from the OPC Server (RSLinx) to the Client requesting the information. It is not routed through the HMI Server.



HMI Tags

In addition to directly referenced data server tags, RSView provides a tag with additional properties for alarms, security, and data manipulation. This type of tag is called an HMI tag. Every HMI Project has its own Tag Database to store these HMI tags.



When to use HMI Tags

You must use HMI tags (that is, you cannot use data server tags) for any of the following things you might need to do in your application.

Alarms An alarm occurs when something goes wrong. It can signal that a device or process has ceased operating within acceptable, predefined limits or it can indicate breakdown, wear, or a process malfunction. In RSView, HMI tags provide the only method for triggering an alarm when a tag has a certain value.

Security You can assign a security code only to an HMI tag. To prevent users from changing a value in a device, create an HMI tag for the device's address, and then assign security to the tag

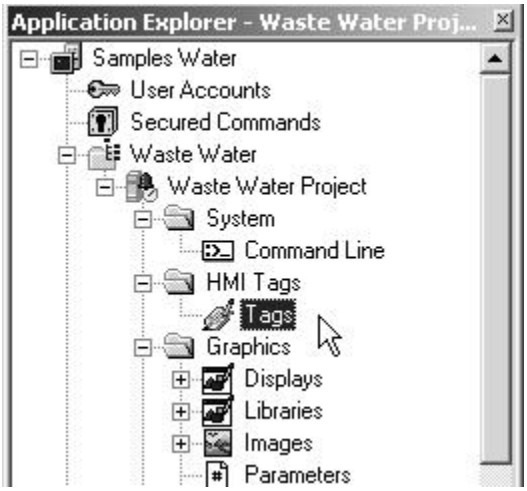
Data manipulation You must use HMI tags if the data server you are using does not provide for scaling or offsetting a value, or setting minimum or maximum limits on a value.

> **Scale and offset** The scale and offset modify the 'raw data' that comes from and goes to the programmable controller before it is saved in the computer's memory (called the value table). The scale and offset also modify the value specified in RSView before it is written to the programmable controller. The scale is a multiplication factor—the value from the PLC is multiplied by the scale. The offset is a fixed value—after the value from the PLC is multiplied by the scale, the offset amount is added.
>
> **Minimum and maximum** HMI Tags allow you to set minimum and maximum values that can be written to the programmable controller or server. These values do not affect what is read from the programmable controller or server. For example, if you specify a minimum of 0 and a maximum of 100, RSView would be able to read a value of 200 from a PLC and store it in the value table, but would not be able to write this value to the PLC.

Storing values in RSView's memory A memory tag can be used to store values without the need for an attached or accessible device. For example, you might need to store a value in memory to store result of a calculation, or to temporarily keep a value - for example, a counter or index number. Values can be calculated and held in memory with Derived Tags.

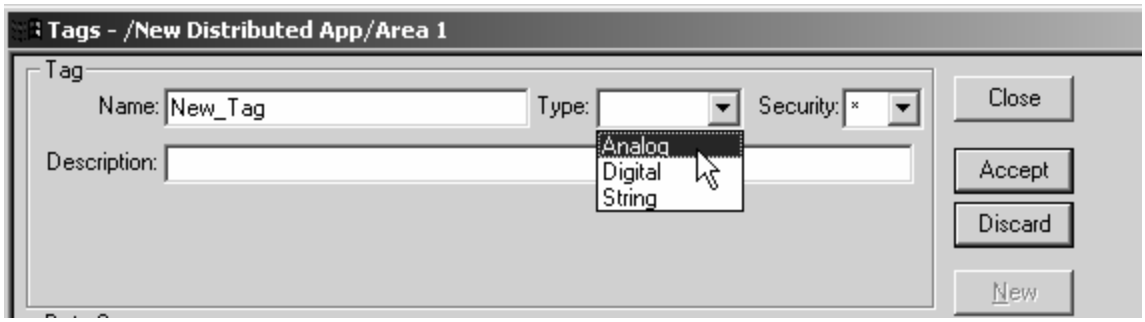
Creating HMI Tags

HMI tags are created within an HMI project. Open the project and expand the HMI Tags folder.



The Tag Database Editor

Tags may be created once a node exists. Open the Tag Database Editor by double clicking the Tags icon in the HMI Tags folder:



Tag Types

Tag type specifies how the application interprets data from the programmable controller, or other source, and how it is represented in the application. Data source specifies where the data for a tag will come from. There are three tag types:

- **Analog** tags store a numeric value from a range of values defined for the tag. Use them to represent devices that can have a range of values such as temperature, pressure, flow, or the position of a rotary control.

- **Digital** tags store a numeric value of either 0 or 1. Use them to represent devices such as switches, contacts and relays that have two states: on or off.

- **String** tags store ASCII strings that can be a string of characters or whole words. The maximum size string allowed is 82 characters.

Tag Data Sources

- **Device** – A tag that gets its value from an external data source. The data can come from a programmable controller or other device via RSLinx or other OPC server.

  Note: See Appendix C of the RSView SE Users Guide for information on using DDE communications with HMI tags.

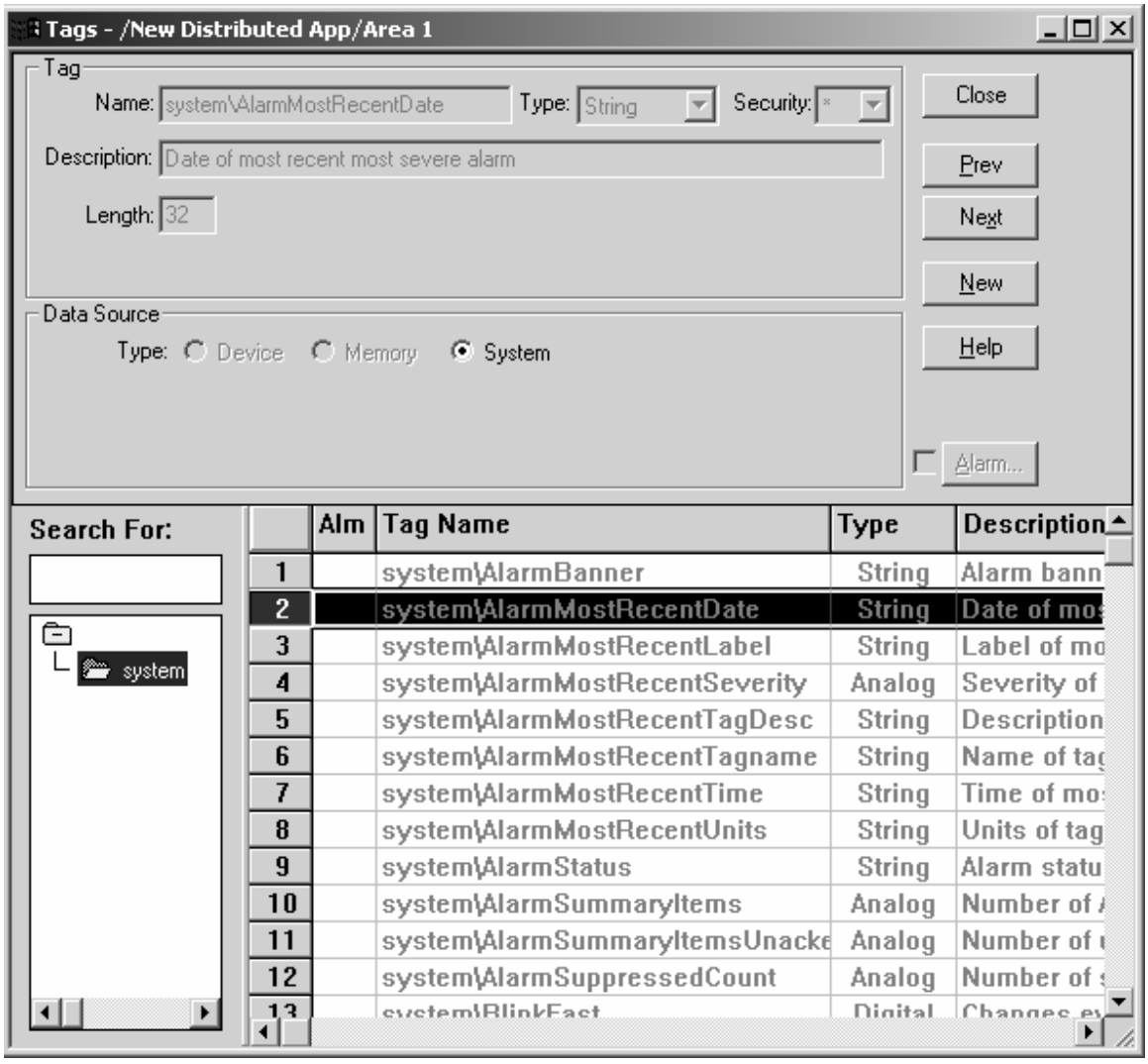
- **Memory** – A tag whose value is stored only in the RSView Machine Edition value table. It does not reference any physical device.

  Note: Memory tags may be designated as Retentive. Their value will remain after an RSView SE Client has shut down.

- **System** – A folder of system tags are created automatically with a new project. These are specialized memory tags that hold system information.

System Tags

The system folder and tags are created by default, and cannot be edited, deleted or added to. They store information generated by the system such as recent alarm values, current time and date, communication status and errors, and currently logged-in user.

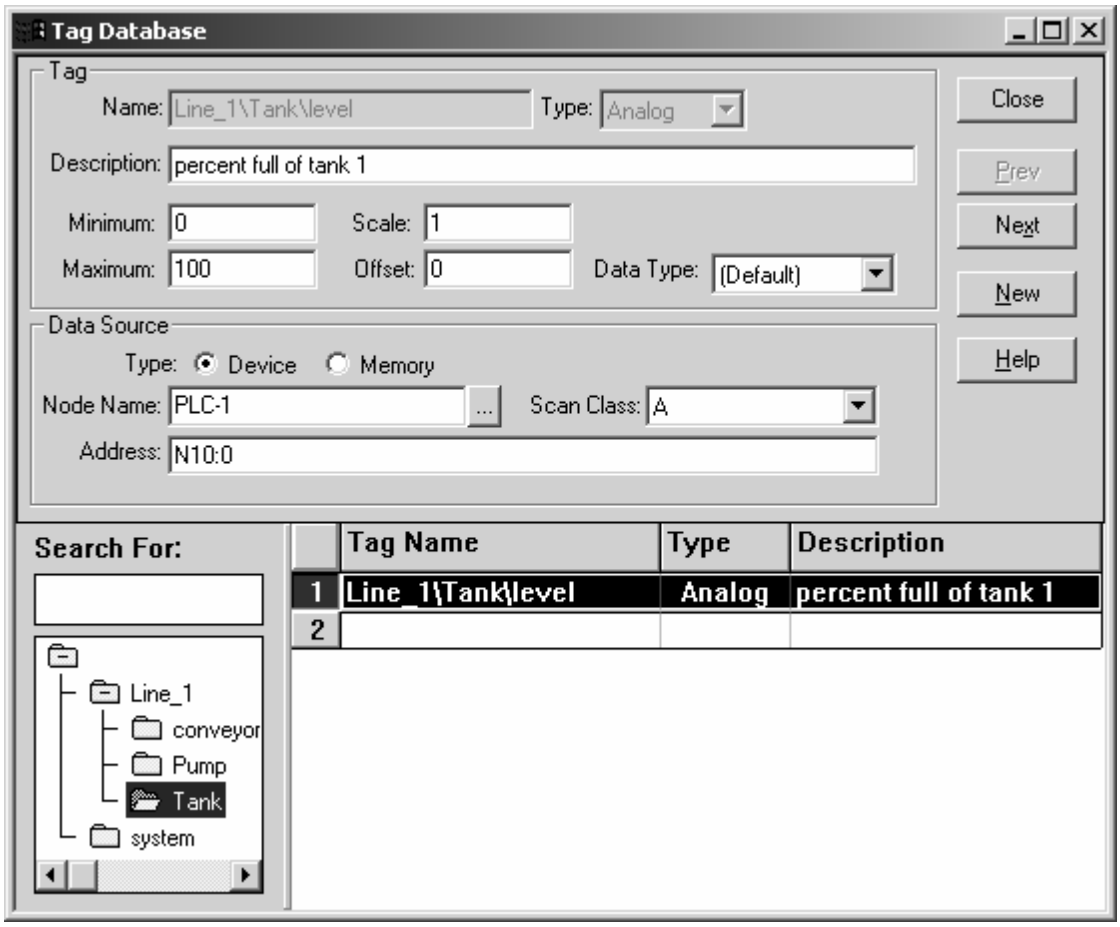


You can use system tags wherever you would use any other tag. For example, you can create a string display object in a graphic display and assign the system tag “system\Time” to the object. At runtime, the object would display the information stored in the system tag, which is the current system time.

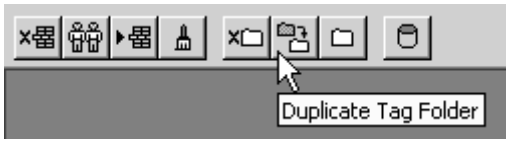
Organizing the Tag Database

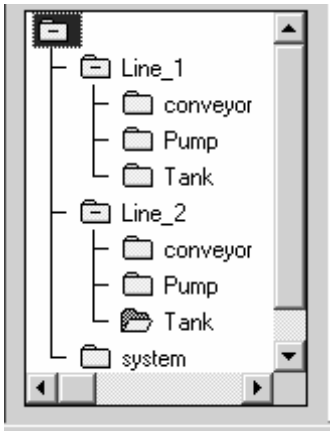
Open the Tag Database editor by double-clicking its icon in the System folder of the Project Explorer. Tags may be organized into a folder hierarchy. Create new folders from the **Edit** menu, or by using the button on the Tag Database toolbar.

A tag's name incorporates the folder(s) it resides in. Once a name and type are given, they cannot be changed. Tag names may be up to 255 characters long. The name can include letters, numbers, the underscore (_), hyphen or minus sign (-), and backslash (\) (for tags in folders).



Entire folders and their contents may be duplicated. This greatly speeds up the development of a project where several similar tag groups are involved.



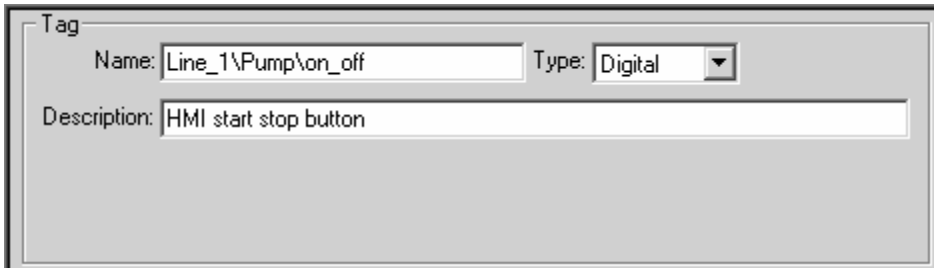


Creating New HMI Tags

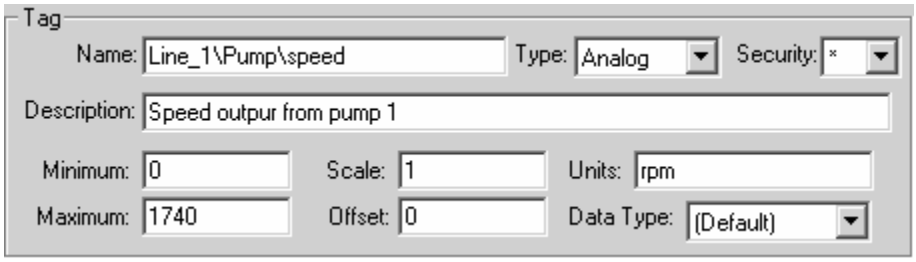
Entering Tags Manually

Create new tags by filling out the form view of the tag database. Fields are available based on the tag type chosen. Once you start editing a tag, the **Accept** and **Discard** buttons are available on the right side of the form. One of these buttons must be selected before moving on to another tag. Accepting a tag edit enters the information into the spreadsheet view of the tag database.

Digital Tag Configuration:



Analog Tag Configuration:



Minimum/Maximum

These boxes establish the minimum and maximum possible values for the tag. They ensure that values outside a specified range will not be written to the data source. However, values outside the range can still be read from the data source. The minimum and maximum values for a floating point analog tag cannot exceed the range +/- 3.40282e +38.

Numeric values must use the decimal point (.) as the decimal symbol, regardless of which decimal symbol is specified in the Regional Settings of the Windows Control Panel.

Scale

Specify a scale value. The value from the data source is multiplied by the scale value before it is written to the database. It is divided by the scale value before it is written to the data source. A scale value of 0 will result in an error.

Numeric values must use the decimal point (.) as the decimal symbol, regardless of which decimal symbol is specified in the Regional Settings of the Windows Control Panel.

Offset

Specify an offset. It is added to the (scaled) value from the data source before the value is written to the database. It is subtracted from the value before it is written to the data source.

Scale and Offset values work together to modify the "raw data" that comes from, and goes to, the data source. Scale is a multiplication factor and Offset is a fixed value. Values from the data source are first scaled, then the offset is added. The formula for this calculation is:

RSView value = (data source value * scale) + offset

When a number is written to the data source, the process is reversed. That is, the offset is subtracted, and the scale number is used for division. The formula for this calculation is:

data source value = (RSView value - offset) / scale

This ensures that the correct, unmodified value is sent to the data source.

The default values are Scale = 1 and Offset = 0. With these values, a value from the data source will be saved in the database unmodified, and values from the database will be written to the data source unmodified.

Numeric values must use the decimal point (.) as the decimal symbol, regardless of which decimal symbol is specified in the Regional Settings of the Windows Control Panel.

Units

Type the units the tag value is measured in, for example, PSI or rpm. This text label is for display only. It can be up to 20 characters long.

Data Type

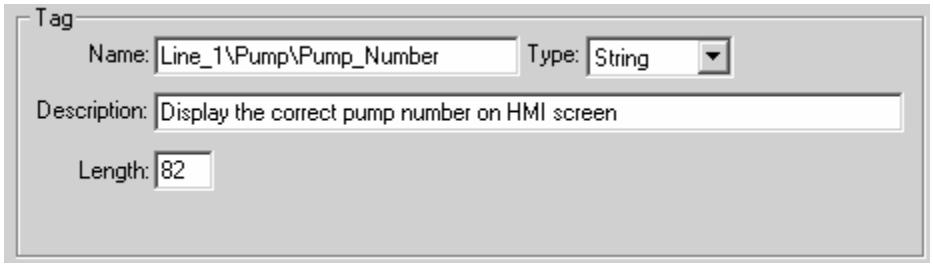
For analog tags with Device as the data source, select the data type that matches the format of the data stored in the programmable controller or Windows application. Choose Default to automatically match the data format specified by the address for the device.

Do not use Default for OPC nodes, because the default might not be as expected.
For tags with Memory as the data source, select the data type that matches the format of the data you will store in the tag. Choosing Default is the same as choosing Floating Point format.

These are the data types and their allowable minimum and maximum values:

- Unsigned Integer - unsigned 16 bit integer; range 0 to 65535
- Integer - signed 16 bit integer; range -32768 to 32767
- Long Integer - signed 32 bit integer; range -2,147,483,648 to 2,147,483,647
- Floating Point - single-precision (32-bit) floating point;
    - range -3.40282e+38 to -1.17549e-38, 0, 1.17549e-38 to 3.40282e+38
- Byte - unsigned 8 bit integer; range 0 to 255
- 3-Digit BCD - 3-digit binary-coded decimal; range 0 to 999. This data type is only supported with the Direct driver node definition reserved for Allen-Bradley devices. Using this data type with an OPC server (including RSLinx) will produce unexpected results.
- 4-Digit BCD - 4-digit binary-coded decimal; range 0 to 9999. This data type is only supported with the Direct driver node definition reserved for Allen-Bradley devices. Using this data type with an OPC server (including RSLinx) will produce unexpected results.

String Tag Configuration



Length

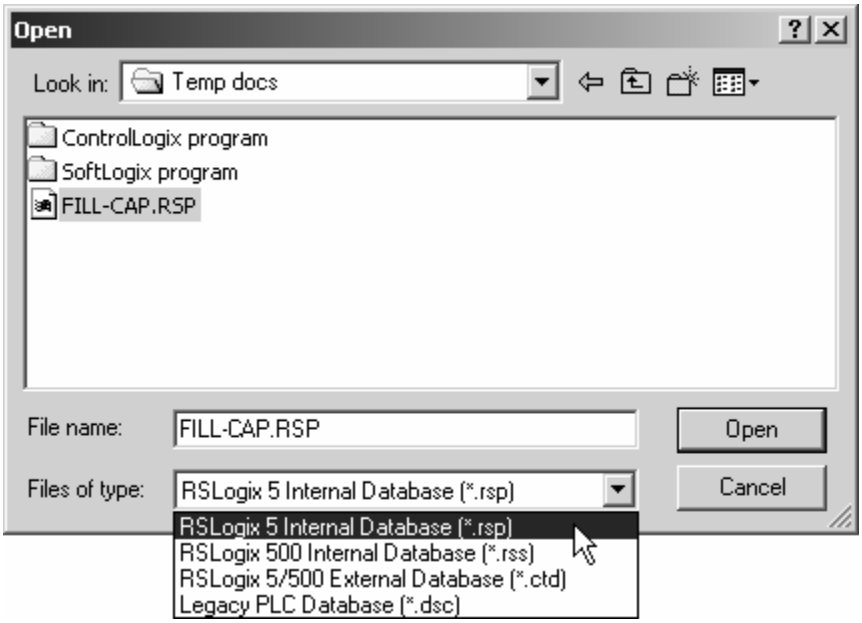
Type a number between 1 and 82 to specify the length of the string tag in bytes. The length must be a multiple of the size of the programmable controller data element you're addressing. For example, if you reference two-byte data elements in an integer section, the string tag length must be a multiple of two. If you reference one-byte data elements in an ASCII section, the string tag length must be a multiple of one.

The PLC Database Browser

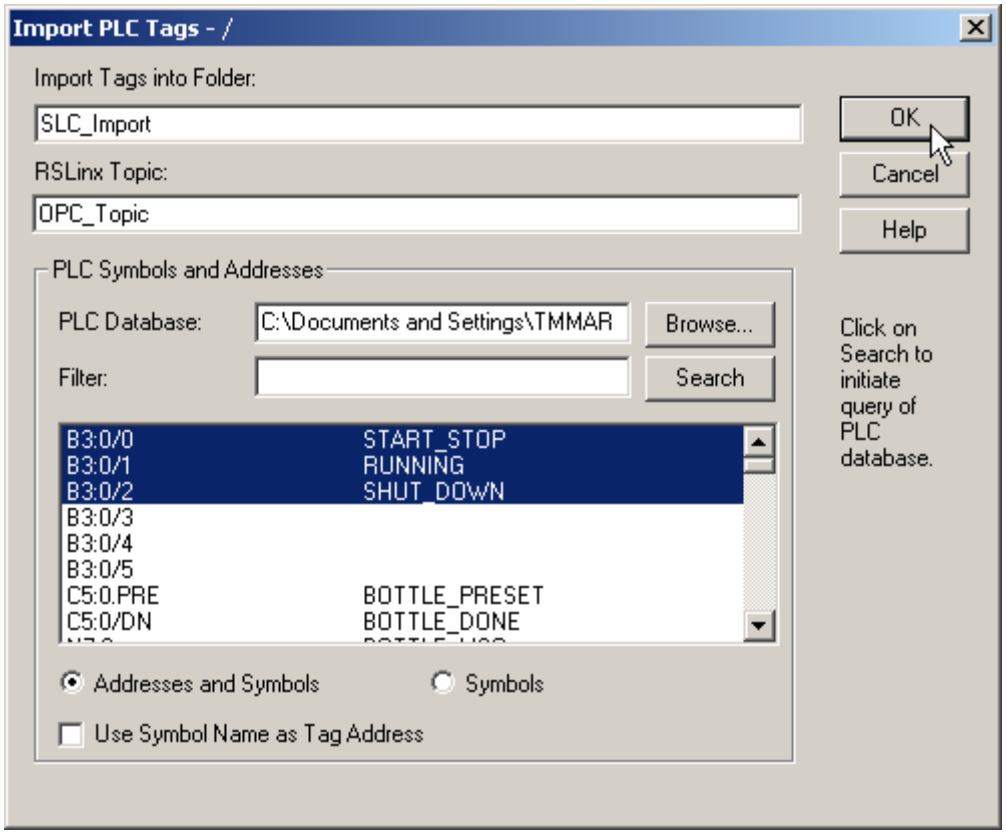
Another way to get tags into the Tag Database is to import Symbol and Address data from an existing ladder logic program. This option applies to PLC/SLC/MicroLogix programs only. With the Tag Database open, choose **Other Databases** from the **Edit** menu, or the **DB Browser** button on the toolbar:

The PLC Database Browser allows you to import data from the following files:

- **.rsp** for RSLogix 5 programs
- **.rss** for RSLogix 500 programs
- **.ctd** for RSLogix 5/500 saved as an external database.
- **.dsc** for legacy PLC databases (created using WinLogic 5 or A. I. 5)



Once the PLC Database file is chosen, a list of Addresses and Symbols will populate the window. This list may be sorted by address or symbol name, and filtered. Wildcards are not used and you cannot filter beyond a slash. Example: filter of B3/1 will not show B3/10, B3/11, and so on.

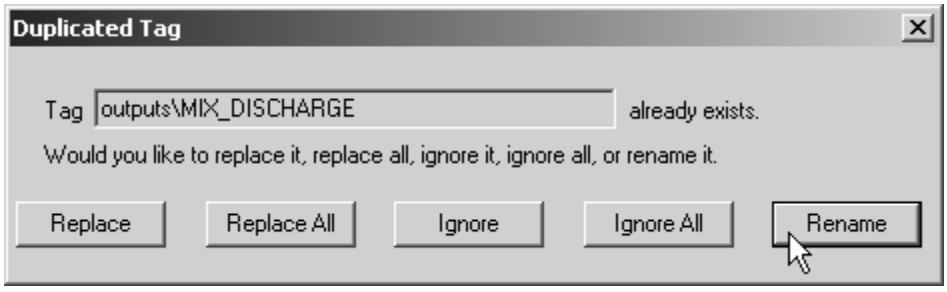


Select the address and symbol sets you wish to import by clicking and dragging in the window. They will be added to the folder that was open when you initiated the PLC Database Browser. You may specify a different folder, or create a new folder, in the "Import Tags into Folder:" field.

Specify an OPC topic that the tags will use.

The Symbol name will become the RSView HMI tag name. If there is no symbol, the address will become the tag name. You have the option to use symbol names as the tag address.

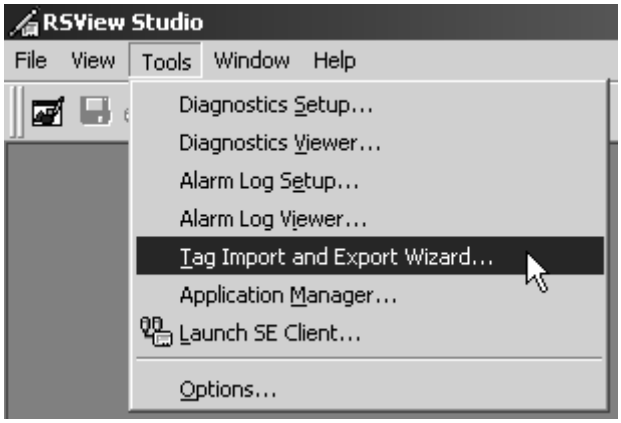
If you import a tag name that already exists, you will be prompted with the following dialog box:



Importing and Exporting the Tag Database

The Tag Import and Export Wizard is included with RSView Supervisory Edition. This utility allows you to export an RSView tag database to the .csv format. This file can be edited in Microsoft Excel, and then imported back into the RSView application.

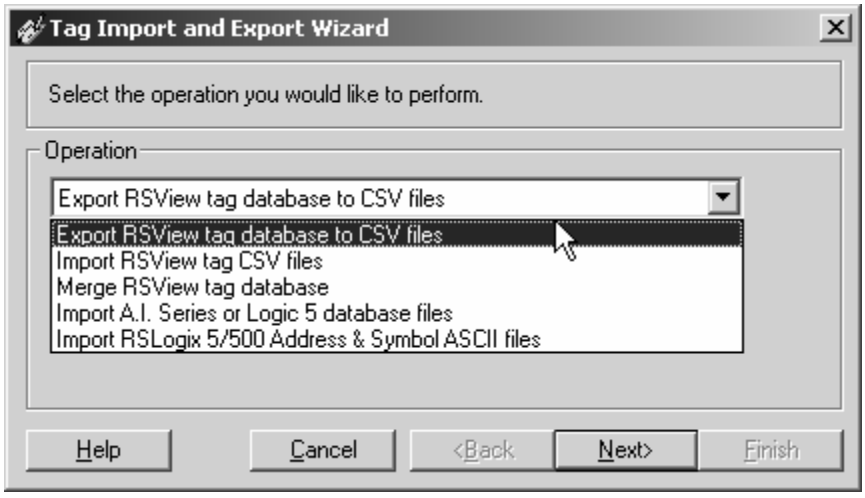
Access the Tag Import and Export Wizard by clicking **Tag Import and Export Wizard** from the **Tools** menu in RSView Studio.



It can also be found in the

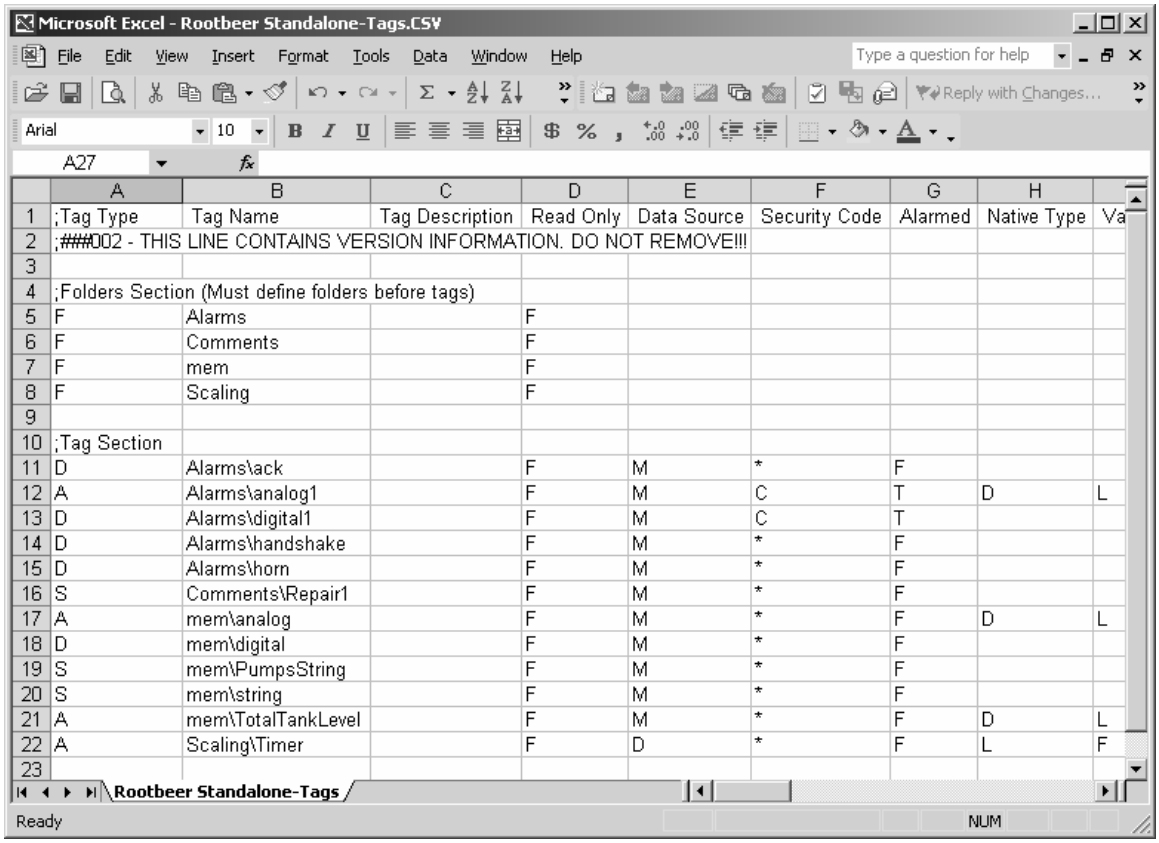
Start – Programs – Rockwell Software – RSView Enterprise – Tools menu

Options with the Tag Import and Export Wizard:


Tag Import and Export Wizard
Select the operation you would like to perform.
Operation
Export RSView tag database to CSV files
Export RSView tag database to CSV files
Import RSView tag CSV files
Merge RSView tag database
Import A.I. Series or Logic 5 database files
Import RSLogix 5/500 Address & Symbol ASCII files
Help
Cancel
<Back
Next>
Finish

Editing the Tag Database in Excel

Once the .csv file is opened in Excel, you are free to modify existing data and add folders and tags. It is safest to copy, paste and modify rows of data so no column information is left out.


Microsoft Excel - Rootbeer Standalone-Tags.CSV
File Edit View Insert Format Tools Data Window Help
Type a question for help
Reply with Changes...
Arial 10
A27

	A	B	C	D	E	F	G	H	
1	;Tag Type	Tag Name	Tag Description	Read Only	Data Source	Security Code	Alarmed	Native Type	Va
2	;###002 - THIS LINE CONTAINS VERSION INFORMATION. DO NOT REMOVE!!!								
3									
4	;Folders Section (Must define folders before tags)								
5	F	Alarms		F					
6	F	Comments		F					
7	F	mem		F					
8	F	Scaling		F					
9									
10	;Tag Section								
11	D	Alarms\ack		F	M	*	F		
12	A	Alarms\analog1		F	M	C	T	D	L
13	D	Alarms\digital1		F	M	C	T		
14	D	Alarms\handshake		F	M	*	F		
15	D	Alarms\horn		F	M	*	F		
16	S	Comments\Repair1		F	M	*	F		
17	A	mem\analog		F	M	*	F	D	L
18	D	mem\digital		F	M	*	F		
19	S	mem\PumpsString		F	M	*	F		
20	S	mem\string		F	M	*	F		
21	A	mem\TotalTankLevel		F	M	*	F	D	L
22	A	Scaling\Timer		F	D	*	F	L	F
23									

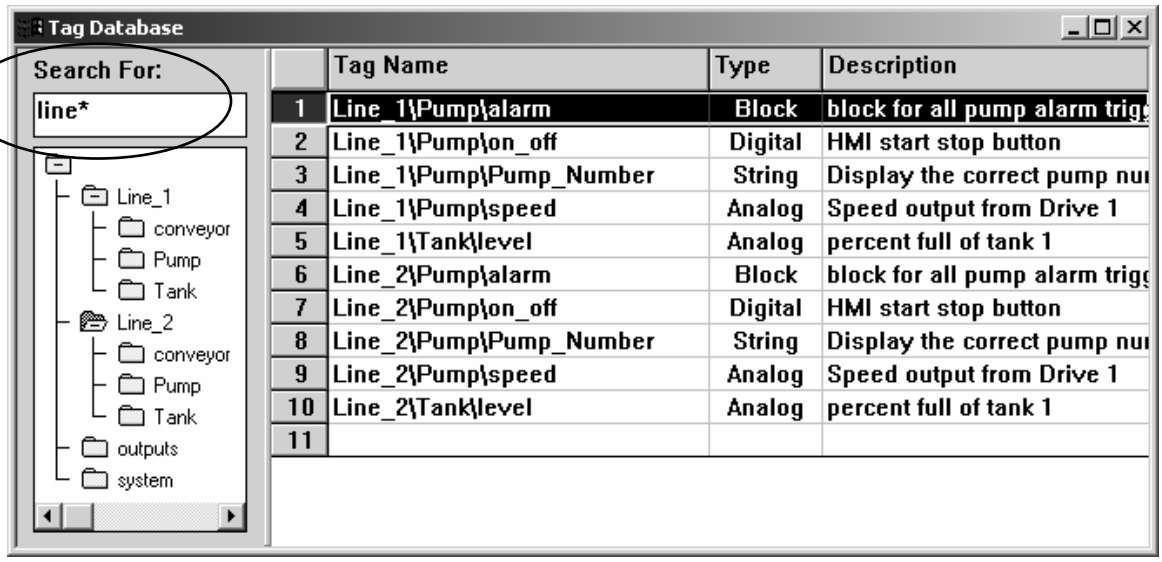
Rootbeer Standalone-Tags

Ready NUM

After your .csv file edits are saved, you can import the new file back into the Machine Edition project with the Tag Import and Export Wizard.

Querying Tags

You can search the Tag Database by typing a search string in the Query Box:

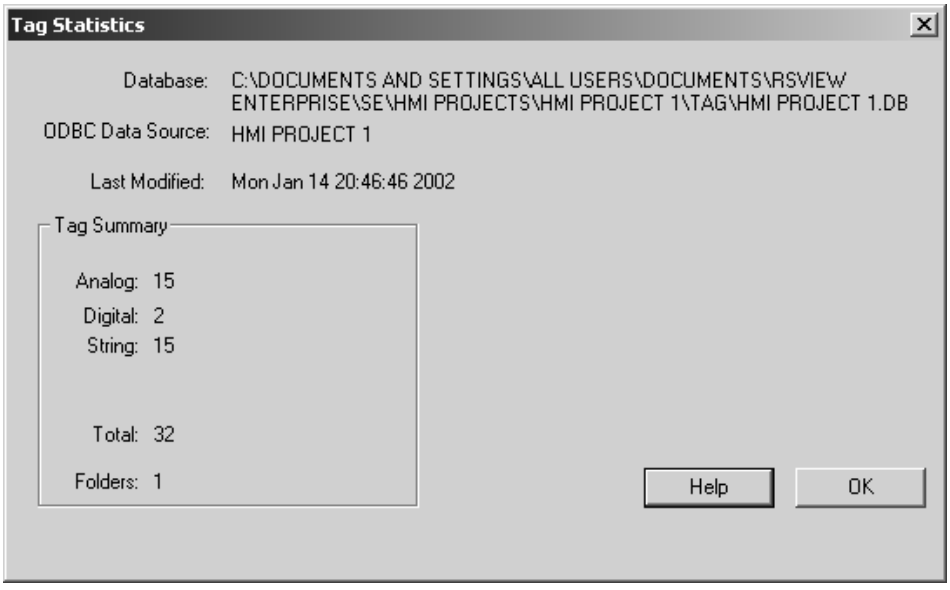


The results are displayed in the spreadsheet view of the Tag Database. Two wildcards may be used for searching:

- * is used to replace any number of characters
- ? is used to replace any single character

Tag Statistics

Choose **Tag Statistics** from the **View** menu (the Tag Database must be open and have focus) to bring up a summary of your Tag Database.



Lab 3 – Create an HMI Tag Database

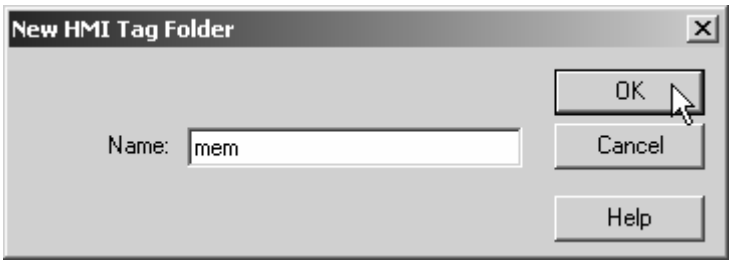
Objective: Create a tag database in your HMI project. Populate the database by entering tags manually. Use OPC Browse to select tag addresses. Use the Tag Import and Export Wizard to edit the database in Excel.

Software Requirements:

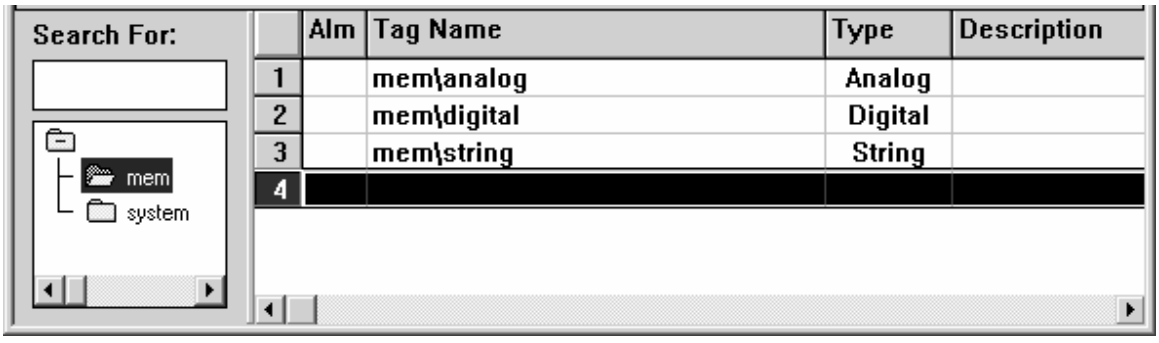
- RSView Studio
- SoftLogix 5860 running the **RSView_Class_SoftLogix** program
- Microsoft Excel

1. Manual Tag Creation

- Open the Tag Database editor by double-clicking its icon in the HMI Tags folder in the Project Explorer.
- Create a new folder for tags called “mem” by selecting **New Folder** from the **Edit** menu, or by clicking the **Create Folder** button.

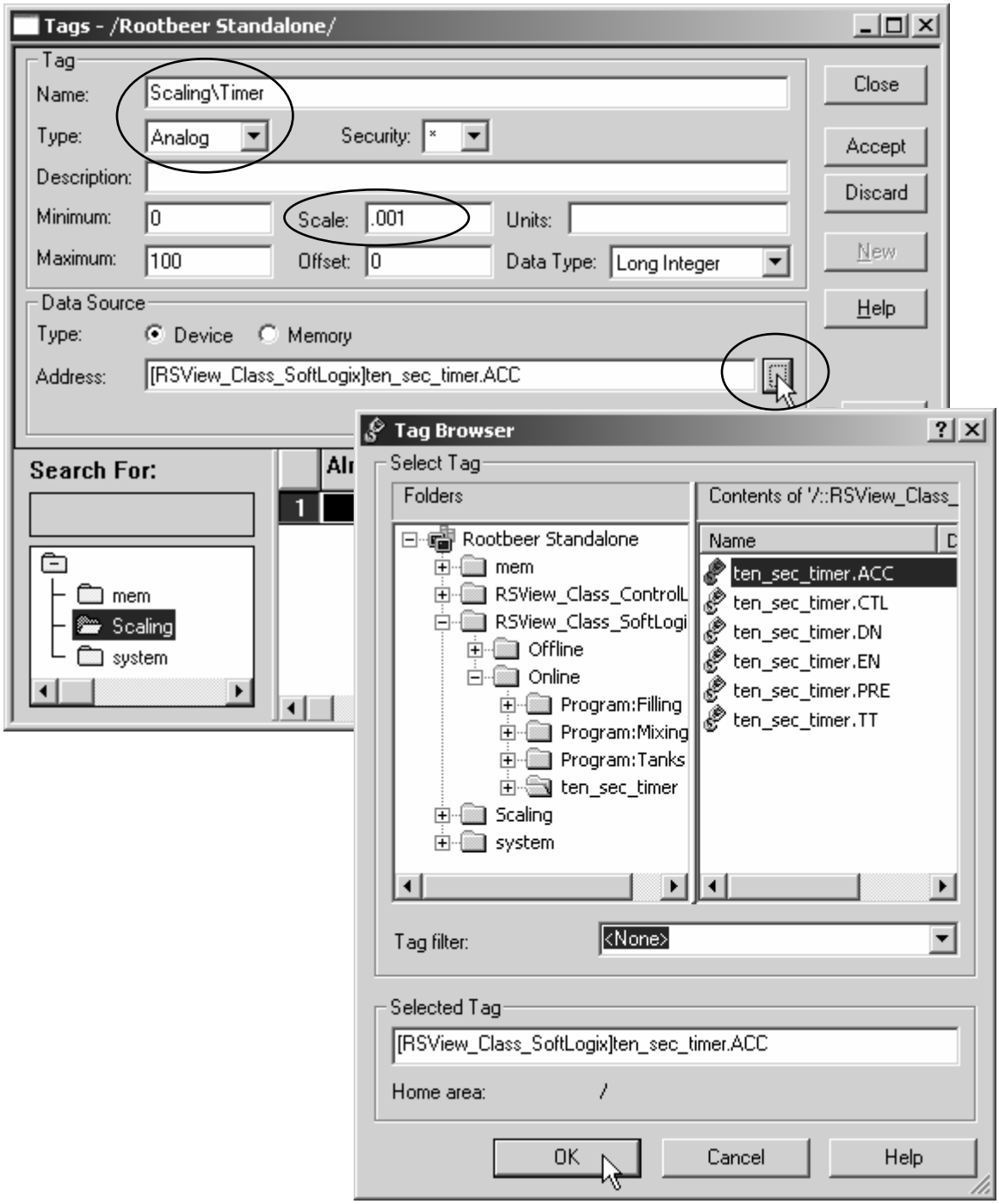


- Manually create three tags in the “mem” folder. Use **Memory** as the Data Source, and keep all the default values.
- Configure the tags to hold their value by designating them **Retentive**.



2. HMI Device Tag

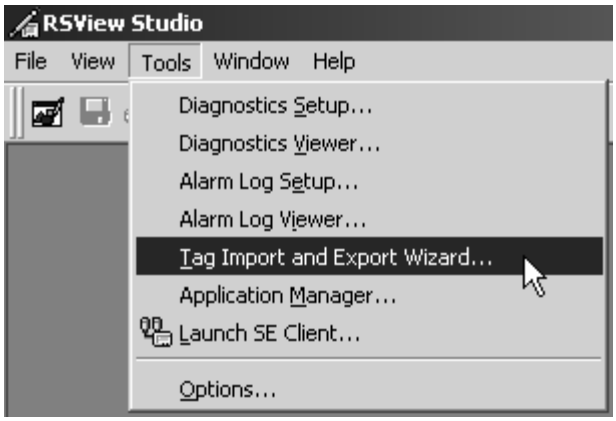
- The timer accumulator in the SoftLogix program is in milliseconds. Create a new HMI tag to scale it. First create a new folder called **Scaling**.
- Create a device tag named **Timer** within the folder.
- Use the Tag Browser to specify the timer accumulator in the SoftLogix.
- The timer accumulator is in milliseconds. Scale it so the end result will be in seconds.



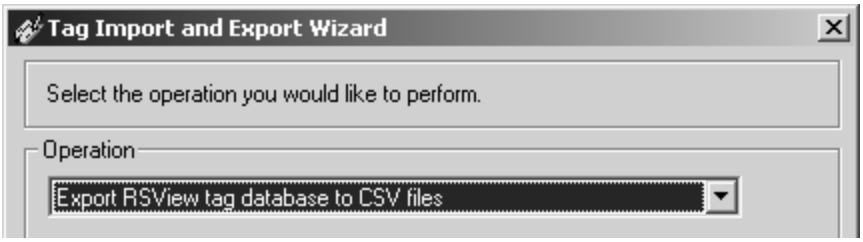
3. Importing and Exporting the Tag Database

In this section you will export the tag database, edit in Excel, and then import your updated file back into RSView Studio.

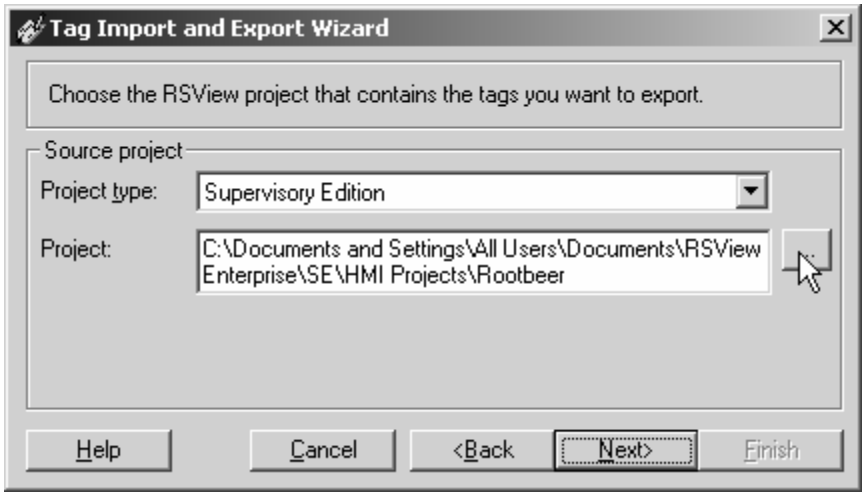
- Open the **Tag Import and Export Wizard** from the Tools menu.



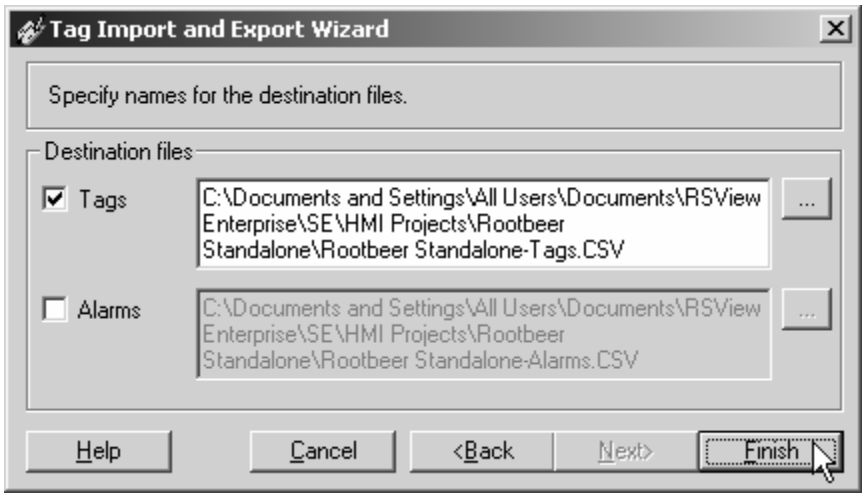
- Choose to export to a CSV file, and click **Next**


Tag Import and Export Wizard
Select the operation you would like to perform.
Operation
Export RSView tag database to CSV files

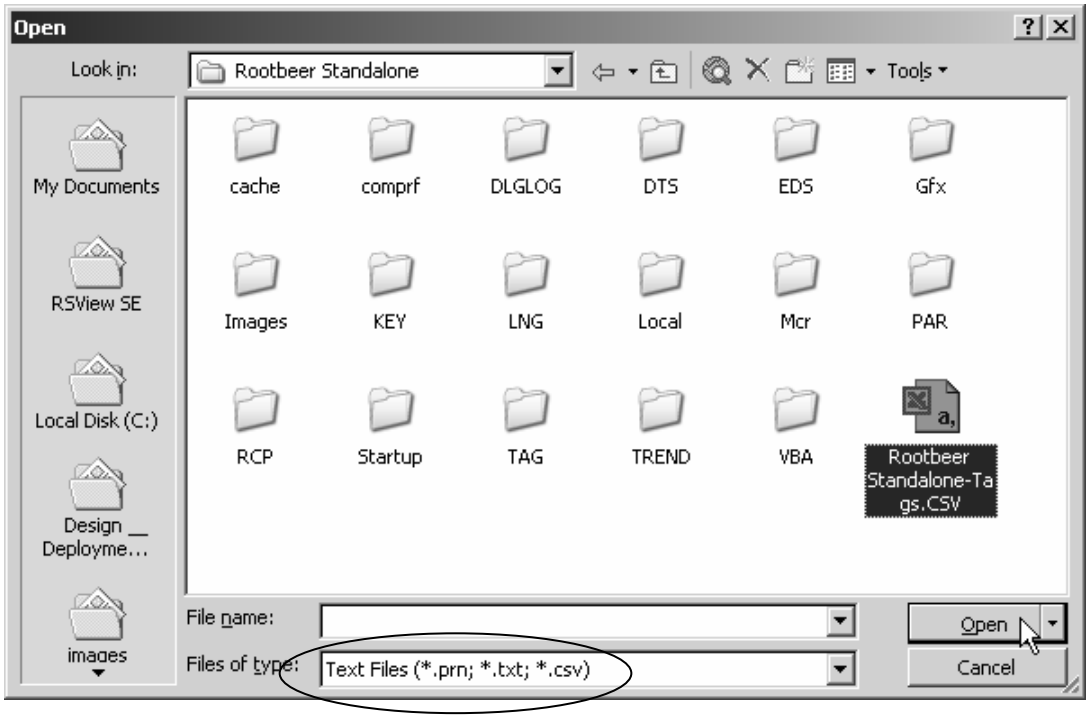
- Select **Supervisory Edition** project type, and browse to your HMI project. Click **Next**



- Create only the Tags file. Note the path. Click **Finish** to create the CSV file.



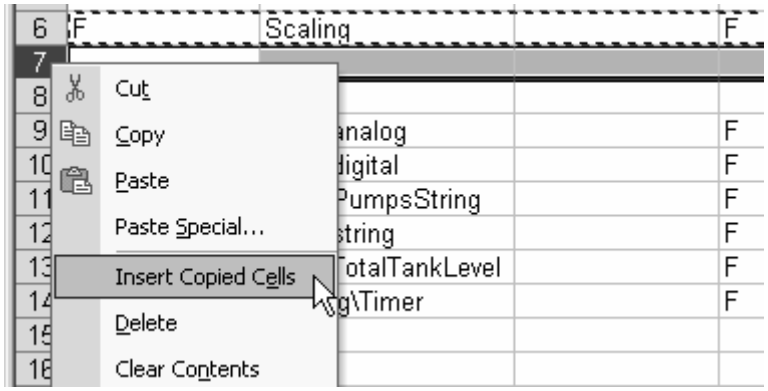
- Open the Tags CSV file. You can either double click on the file in Windows Explorer, or start Excel and open the file. (Make sure and change the **file type** that Excel will look for)

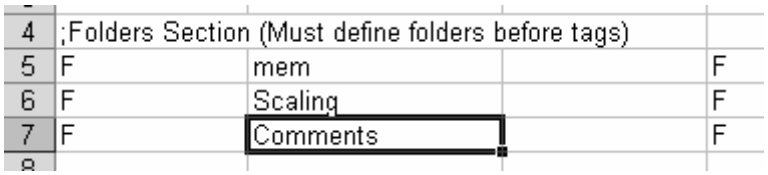


- The CSV file contains the tag and folder information. Look over the column headings in row 1 to see the information included.

	A	B	C	D	E	F	G	H
1	;Tag Type	Tag Name	Tag Description	Read Only	Data Source	Security Code	Alarmed	Native
2	;###002 - THIS LINE CONTAINS VERSION INFORMATION. DO NOT REMOVE!!!							
3								
4	;Folders Section (Must define folders before tags)							
5	F	mem		F				
6	F	Scaling		F				
7								
8	;Tag Section							
9	A	mem\analog		F	M	*	F	D
10	D	mem\digital		F	M	*	F	
11	S	mem\string		F	M	*	F	
12	A	Scaling\Timer		F	D	*	F	L
13								

- Edit the file.
- Add a folder by copying one of the existing folder entries (right-click on row 5 or 6 and select **Copy**) and inserting the copied row into row 7 (right click on row 7 and select **Insert Copied Cells**). Rename the folder **Comments** (in column B).

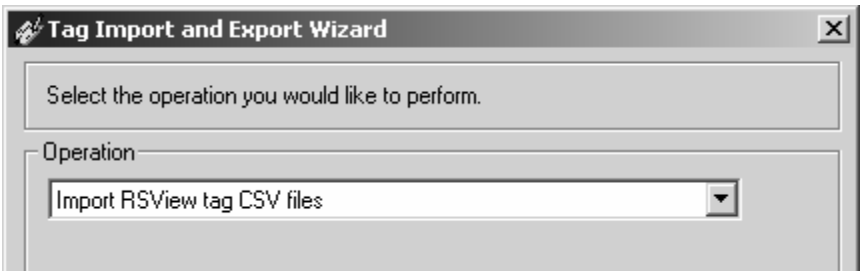




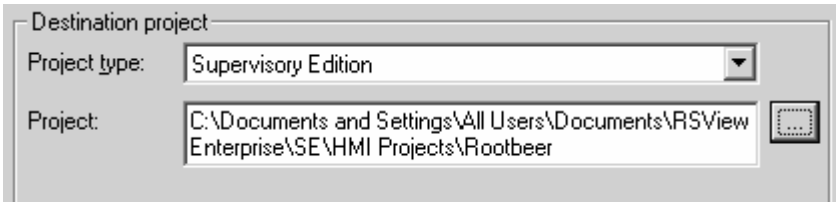
- Create a new string tag in Excel. Copy the row containing the **mem\string** tag (row 12). Insert the copied cells into row 14. Rename the tag **Comments\Repair1**.

9	;Tag Section			
10	A	mem\analog		F
11	D	mem\digital		F
12	S	mem\string		F
13	A	Scaling\Timer		F
14	S	Comments\Repair1		F

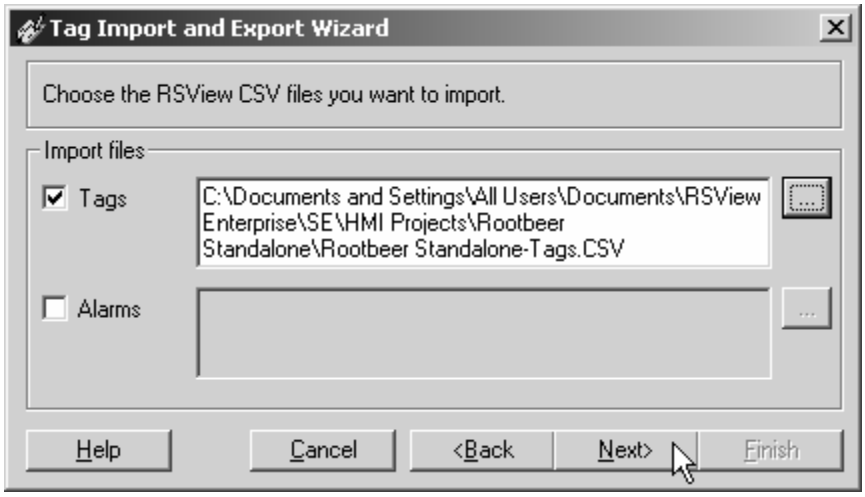
- Save the changes to the .csv file. Answer **Yes** to overwrite the existing file and to keep the workbook in the .csv format. Close Microsoft Excel.
- Import your edited CSV file into your RSView project. Open the Tag Import and Export Wizard again. Choose **Import RSView tag CSV files**. Click **Next**.



- Select your HMI project. Click **Next**.

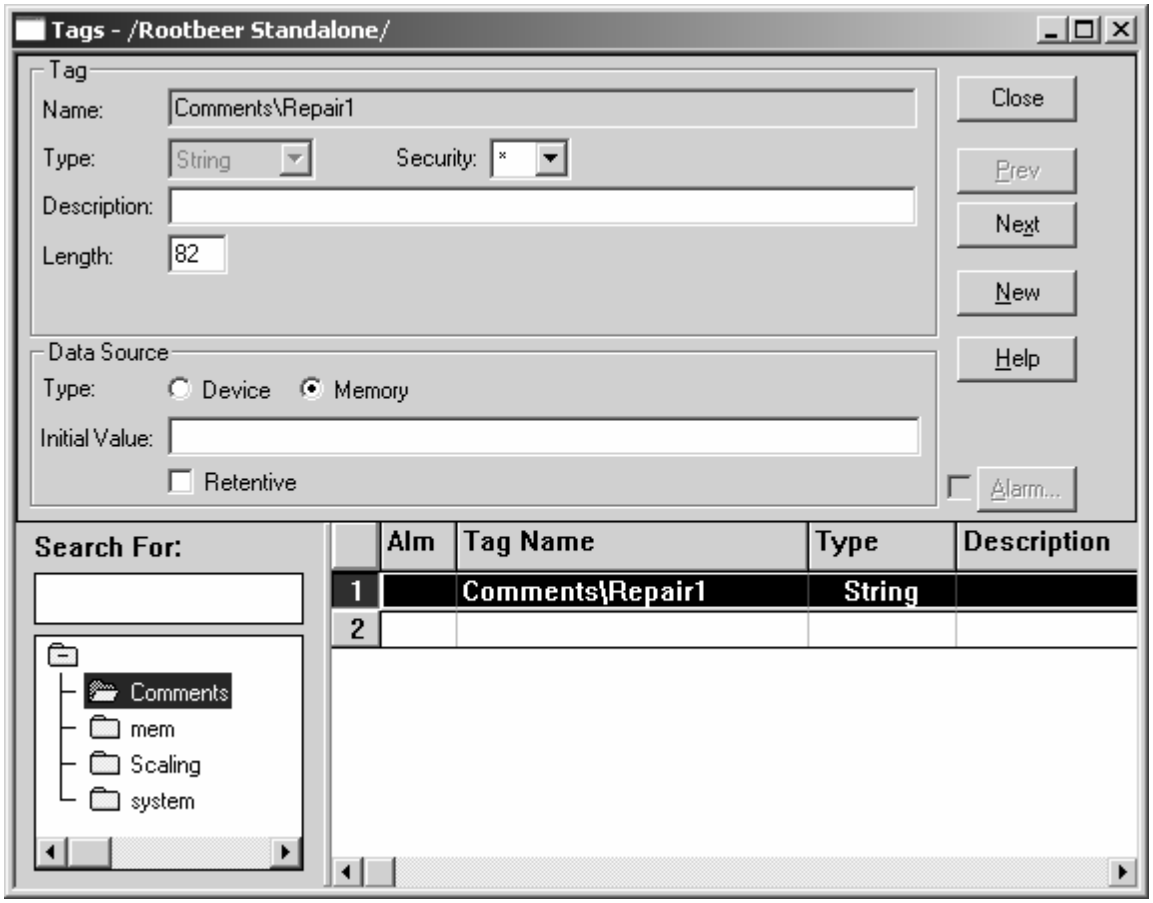


- Select your CSV file to import. Click **Next**.



- You can skip the existing tags, as none were edited. Click **Next**.

- Click **Finish** to start the import.
- The Database Import summary window will open. Review this and close it.
- Go back to the Tag Database editor and confirm that your edits are there. Refresh the Tag Database if it was open from before.



This Lab is Finished

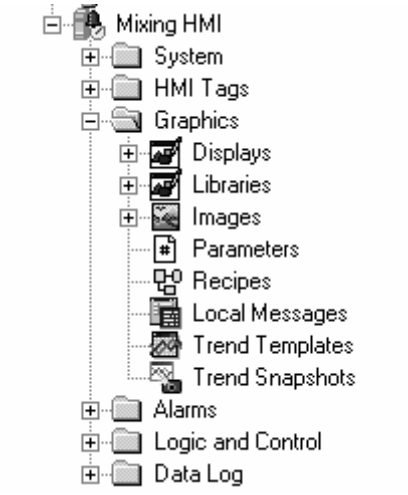
5. *Graphic Displays*

Objectives:

- Use the HMI Project Graphic Display editor to create and modify RSView Supervisory Edition graphic displays
- Configure Display Settings for graphic displays
- Use the Library to add pre-configured graphics to a display
- Learn the different Objects available for use on graphics, including
    - Drawing Objects
    - Indicators
    - Display Navigation
    - Push buttons
    - Gauges, Graphs, Trends
    - Control List Selector
    - Keys
    - Local Message Displays
    - Recipe
    - Active X controls
    - Imported graphics
- Group, Align, and Arrange Objects
- Use Key Assignments for interactive objects
- Use the Object Explorer and Property Panel
- Apply Animation to Objects, copy and paste Animation between Objects
- Use Tag Placeholders and Parameter Files with graphic displays
- Create Local Message Files for use in graphic displays
- Use Test Run to evaluate and troubleshoot a graphic display
- Use Display Navigation to link graphic displays together

The Graphic Display Editor

RSView Machine Edition graphics are created and modified by opening the Graphics folder in the Project Explorer.



The **Displays** editor holds all graphic displays in the project.

The **Libraries** editor contains many pre-built graphics that can be easily added to your project's graphic displays.

The **Images** editor holds bitmap images used in the project's graphic displays.

The **Parameters** editor holds Parameter Files for use with graphic displays containing Tag Placeholders.

The **Recipes** editor holds recipe text files used to load saved values into numeric and string inputs.

The **Local Messages** editor holds Local Message files for use with graphic displays containing a Local Message Display object.

The **Trend Templates** editor holds trending .tem files used to save trend configurations.

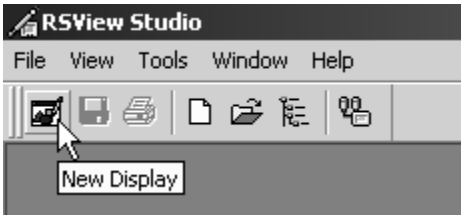
The **Trend Snapshots** hold .dbf files of trending data that has been saved. These files may be overlaid on a trend object.

Creating a New Graphic Display

A graphic display represents the operator's view of plant activity. The display can show system or process data and provide operators with a way to write values to an external device such as a programmable controller. Operators can also print the display at run time to create a visual record of tag values.

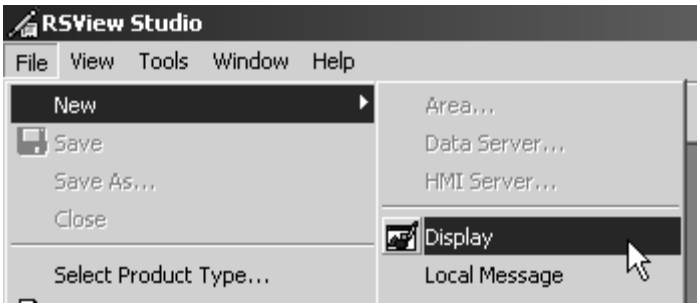
There are multiple ways to create a new display.

A **New Display** button is part of the Standard toolbar:

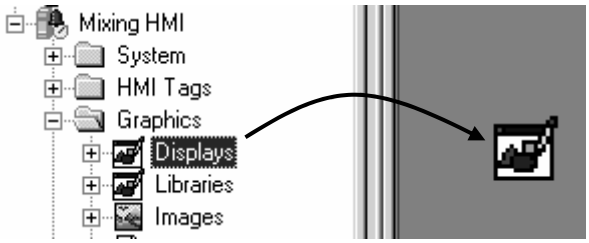


Right-click the **Display** icon in the Graphics folder in the Application Explorer:

Select **Display** from the **New** command under the **File** menu:

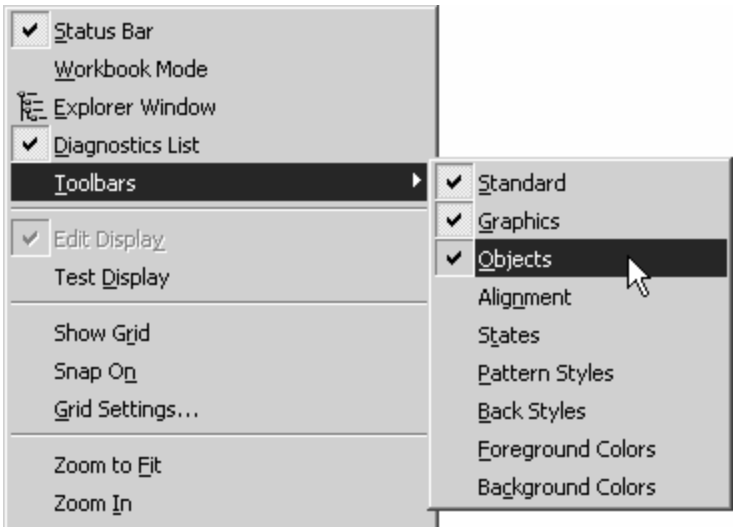


Drag and drop the **Display** icon in the Graphics folder into the right pane:

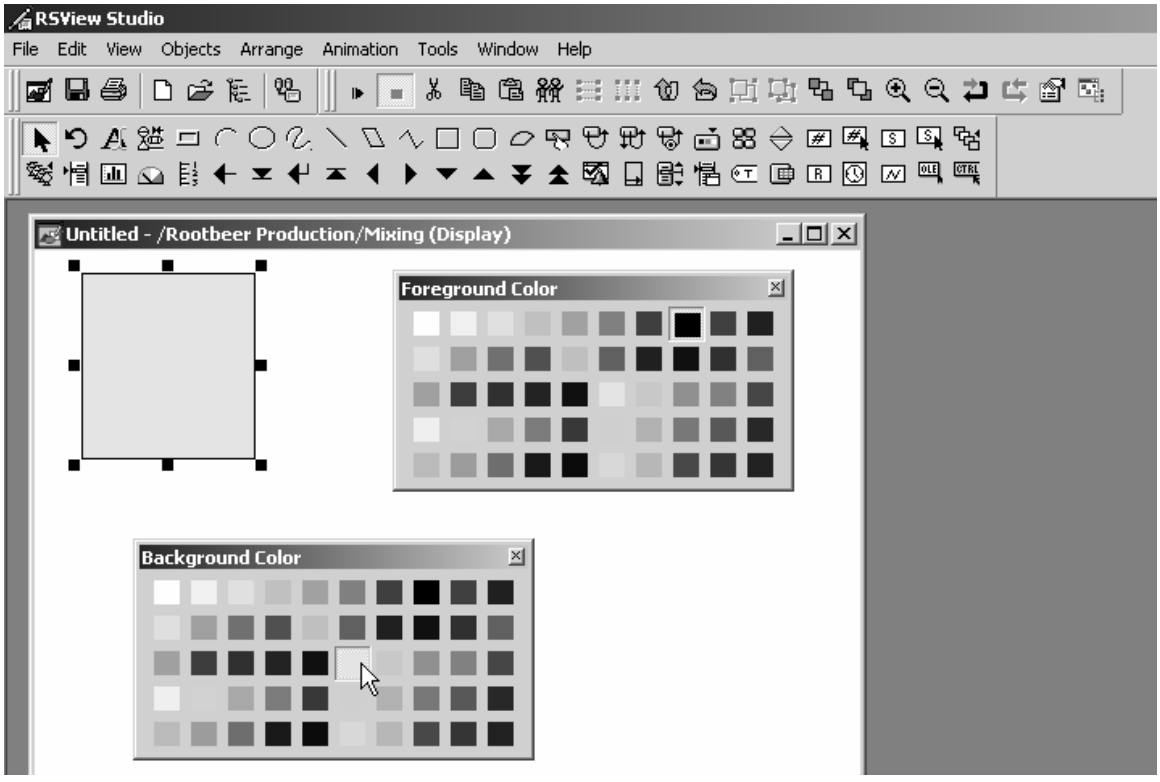


Customizing Your Environment

Many toolbars are available when using the Graphics Editor. Choose to show or hide these from the **View** menu.

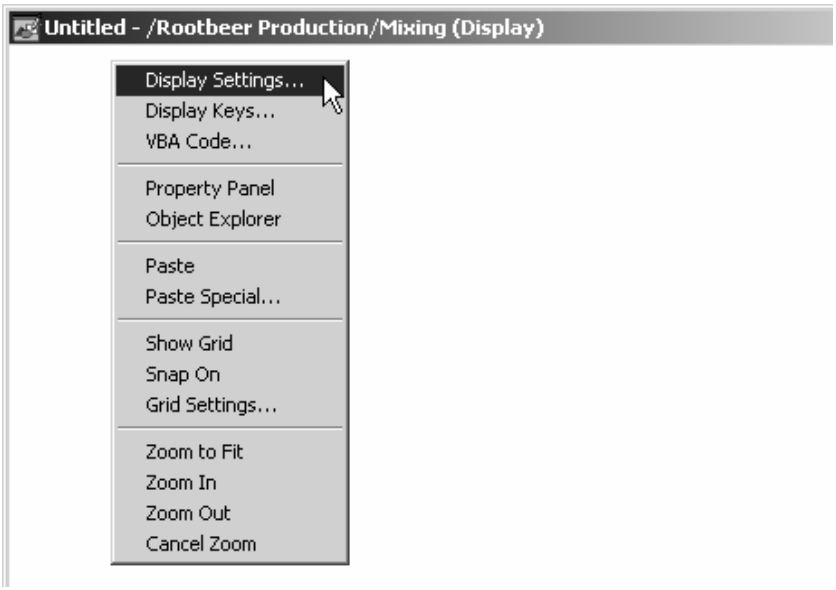


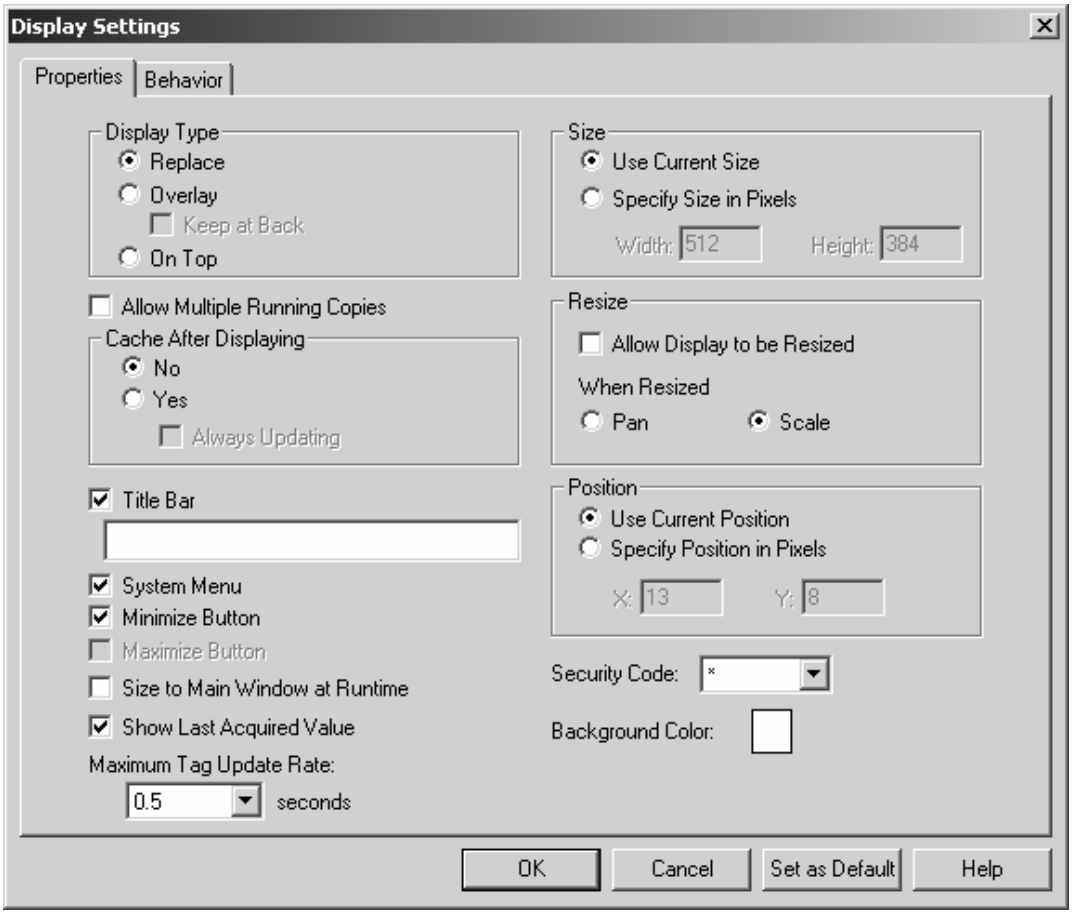
It may be helpful to display toolbars while editing a graphic display. Any of the toolbars may be floated in your editing area, or docked in the window.


RSView Studio
File Edit View Objects Arrange Animation Tools Window Help
Untitled - /Rootbeer Production/Mixing (Display)
Foreground Color
Background Color

Display Settings

Display Settings determine how the graphic display will look and act during runtime. Open the Display Settings Editor from the **Edit** menu, or by right-clicking in an open area (not on an object) of the graphic display.





Properties Tab

Displays can be one of three different types:

- **Replace** - Choose Replace to have this display replace any display of any type on the screen at run time, if this display overlaps the other by at least one pixel.
- **Overlay** - Choose Overlay to position this display over any others on the screen.
- **On Top** - Choose On Top to position the display in front of any other display (of overlay or replace types) that might be open at run time.

Tip: At run time use the PullForward, PushBack, and SetFocus commands to cycle through multiple On Top and Overlay screens.

You can fix the **size** and **position** of the graphic here, or leave at “Use Current Size” .

Use the **Cache After Displaying** settings to affect the graphic performance.

Choose **No** if you don’t want graphic displays loaded into the display cache when they are displayed for the first time. This saves memory at the expense of performance. To remove displays from the cache use the FlushCache command.

Choose **Yes** to load a graphic display into the display cache when it is displayed for the first time. This makes subsequent displays of the graphic faster because it does not have to be read from disk.

Each display in the display cache uses memory. Once Windows consumes all physical memory, it is forced to swap to disk. This results in all system activities slowing down.

To conserve system resources, you should limit the total number of displays in the cache to 40. This includes displays loaded using this option or using the Display /Z or /ZA command. You should also limit the number of screens that are displayed or minimized simultaneously to 40.

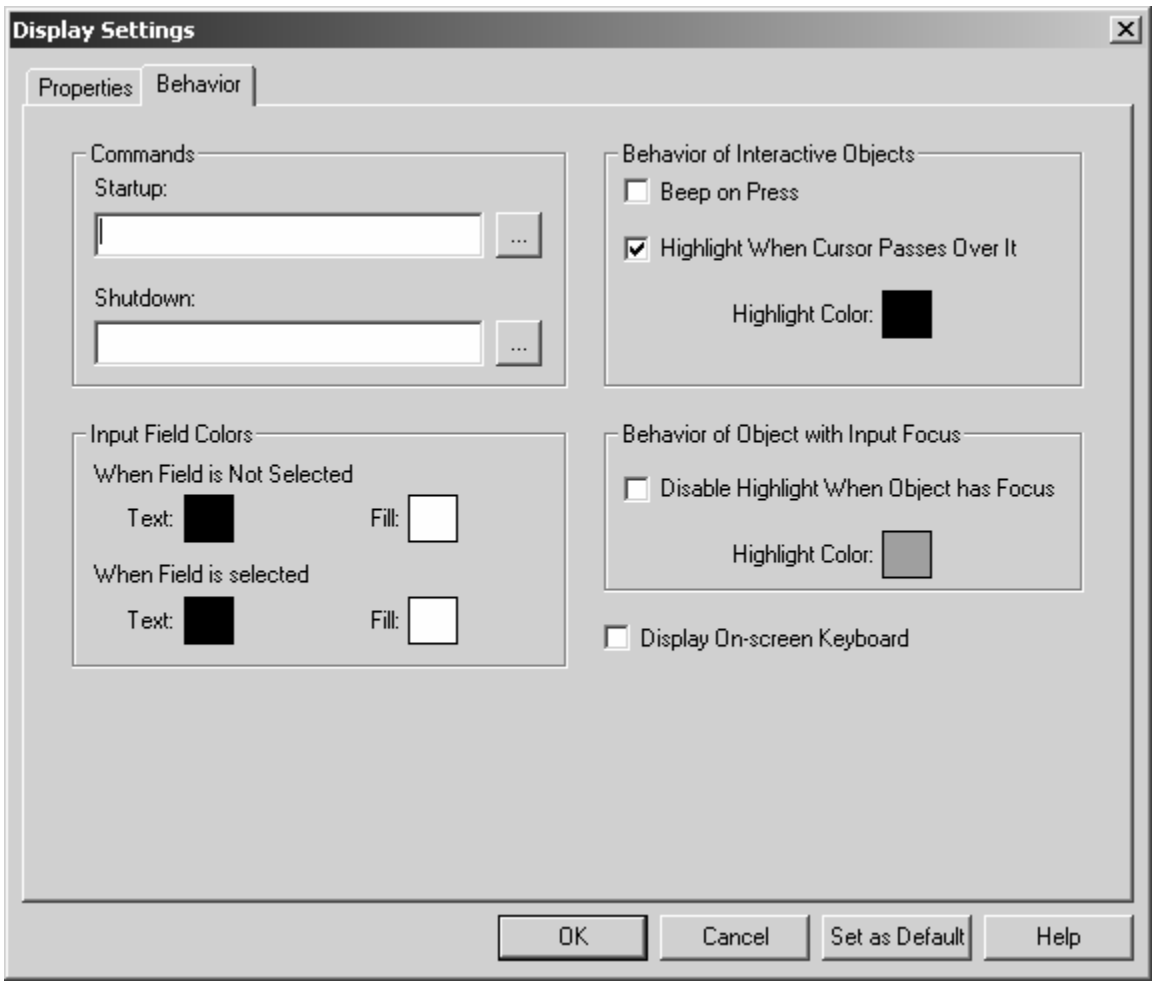
Always Updating

Check this box to keep the cached display up-to-date. For example, choose this option to continuously update trend data for the display, even when the display is not visible. This option also makes subsequent displays even faster.
Always updating a cached display can cause added communications overhead because data will be retrieved for tags whose values wouldn't otherwise be needed.
If you use the Always Updating option with the Cache After Displaying option (Display /ZA), the startup command is executed when the display is loaded into the cache. The shutdown command is executed only when the cache is flushed (using the FlushCache command).

The tag update rate may be limited by the display settings.

Select an item from the **Maximum Tag Update Rate** drop-down list to specify the maximum rate at which tags in the display will be updated. The fastest maximum rate for tags to be updated is every .05 seconds.

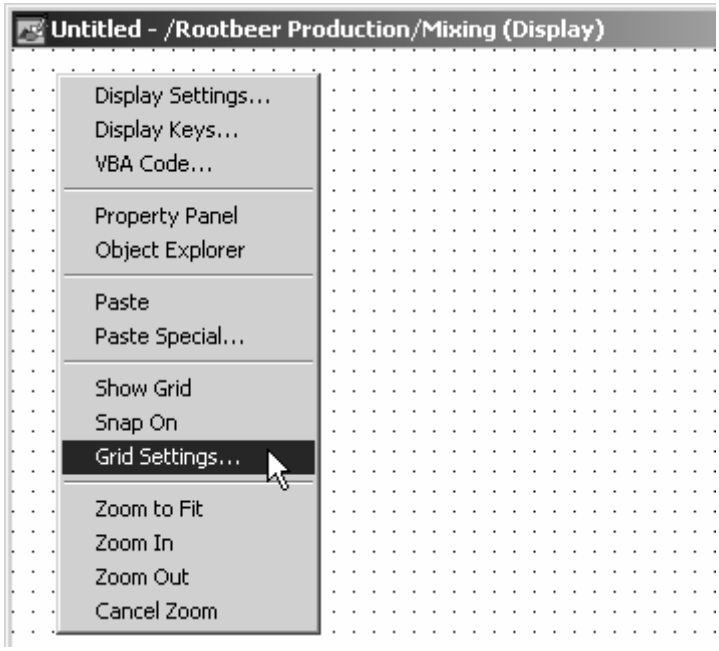
Behavior Tab

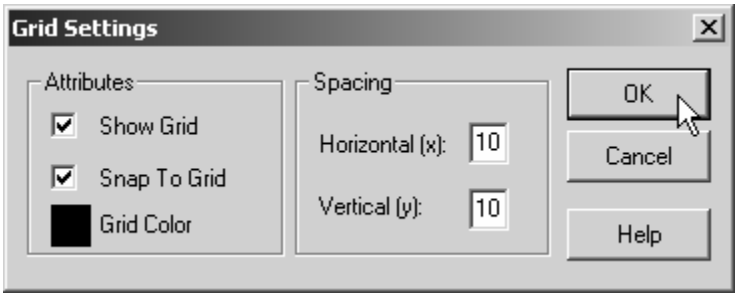


You may run a command or macro when a display is started up or shut down.

Grid, Snap and Zoom

A grid may be displayed to assist you in placing objects on the graphic display. Select the **Grid Settings** command from the right click menu, or from the **View** menu, to configure how the grid looks. The **Show Grid** and **Snap On** commands may be toggled from these same menus. In addition, you may zoom in and out of the graphic to see objects in more detail.



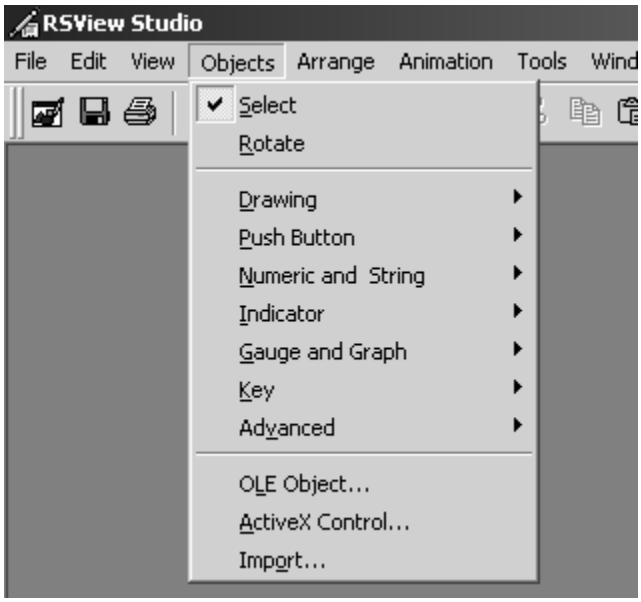


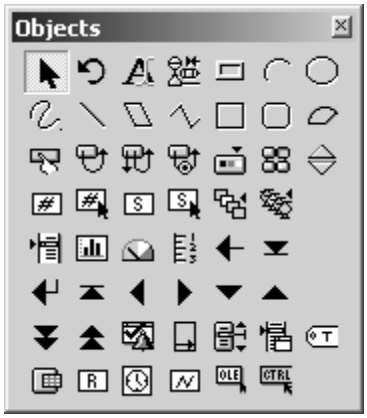
Using Objects in a Graphic Display

Build a graphic display by placing objects on it. There are objects for every part of the user interface:

- **simple drawing objects** - includes geometric and freehand shapes, text, and bitmaps. You can combine these to create more complex objects and animate them by attaching a tag or expression.
- **native objects that require setup** - includes push buttons, numeric and string input and display objects, indicators, gauges, graphs, keys, and the objects on the Advanced submenu.
- **OLE objects** - the OLE objects that are available to you depend on the software installed on your system, but can include spreadsheets, charts and text produced by other Windows applications.
- **ActiveX objects** - consist of third-party ActiveX objects that can provide functionality such as sliders, check boxes, radio buttons, Web browsers, and so on. The ActiveX objects available to you depend on the software installed on your system.

Select an object from the **Objects** menu, or by displaying the **Objects** toolbox:



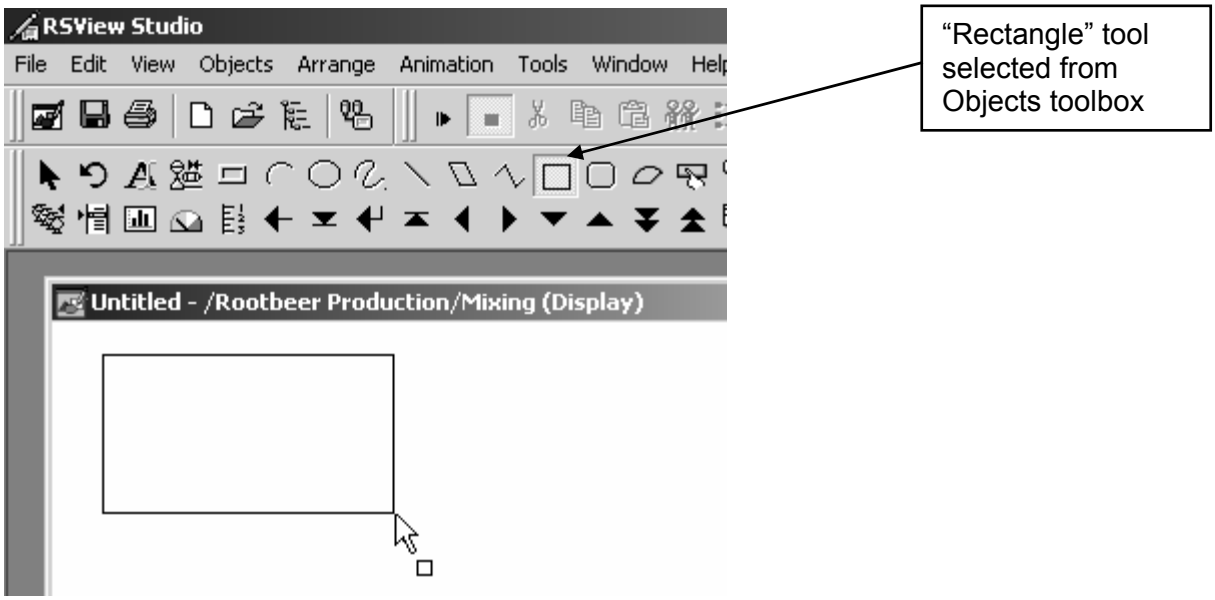


Drawing Objects

The following Drawing Objects may be added to a graphic display:

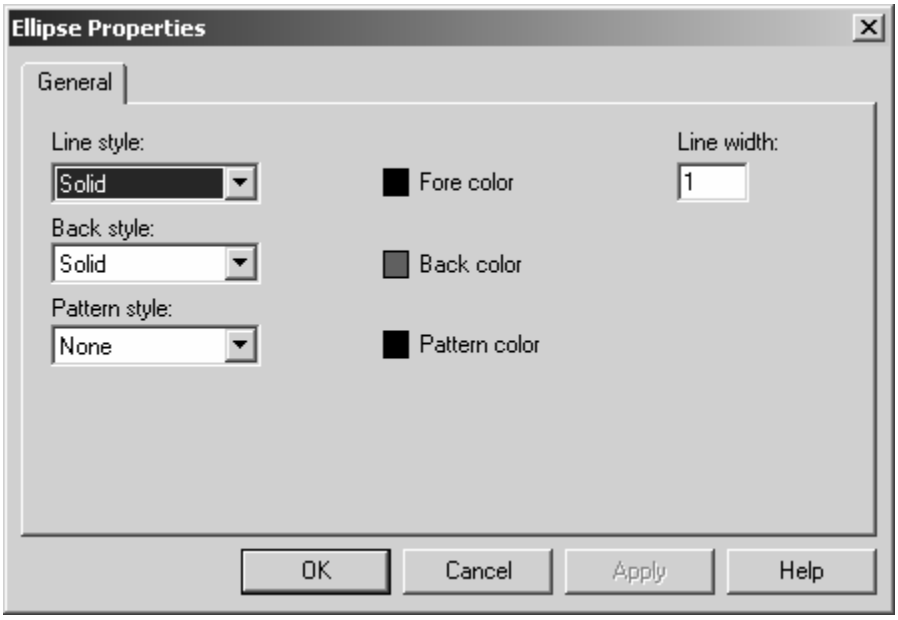
To use an object, select the appropriate tool (from the **Objects** menu or toolbox), then click and drag onto your graphic display.

Note: Hold the CTRL key while dragging to create perfect squares (rectangle tool), circles (ellipse tool) or horizontal or vertical lines (line tool).


RSView Studio
File Edit View Objects Arrange Animation Tools Window Help
Untitled - /Rootbeer Production/Mixing (Display)
"Rectangle" tool selected from Objects toolbox

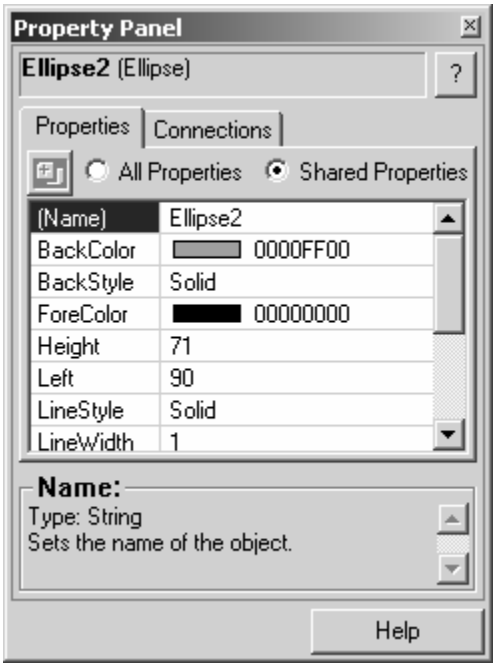
Object Properties

Double-clicking an object brings up its Properties dialog box. Options will differ depending on the object. For example, double-clicking on an ellipse brings up the following:



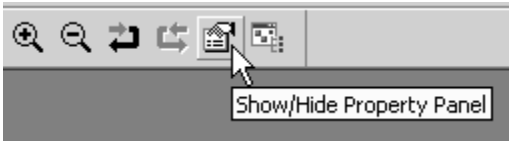
The Property Panel

Another way to edit the properties of an object is to open the Property Panel. Select this from the right click menu, the **View** menu, or from the toolbar.



The Property Panel is an especially useful tool when editing properties of multiple objects. By selecting all the objects you are interested in changing, then showing the Property Panel, you can change a property across all objects.

It is also helpful to show the Property Panel while you click on separate objects. It is not necessary to double-click on each object in this case, you simply edit the properties of each object as you click on it.



Arranging Objects

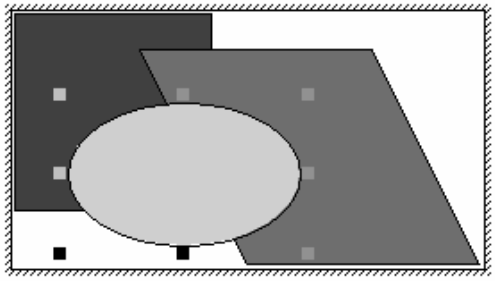
Select multiple objects by

- Holding the CTRL key while single clicking on objects
- Clicking and dragging the cursor completely around the objects you want to select

Grouping

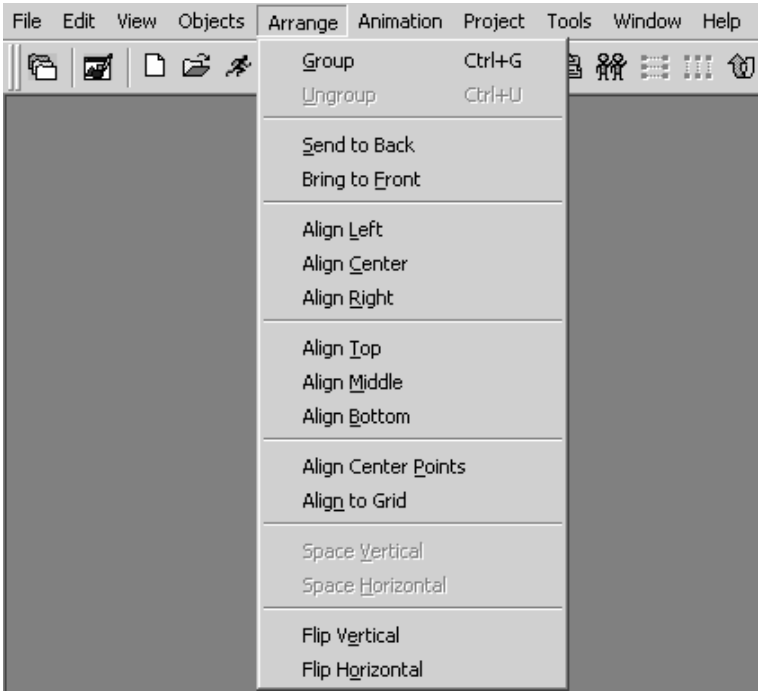
Once multiple objects are selected, you may group them into one object. Select the **Group** button on the **Graphics** toolbar, or the **Group** command from the **Arrange** menu.

Edit grouped objects by double clicking the group. You may single click each item within the group to edit that item. The group does not need to be ungrouped:



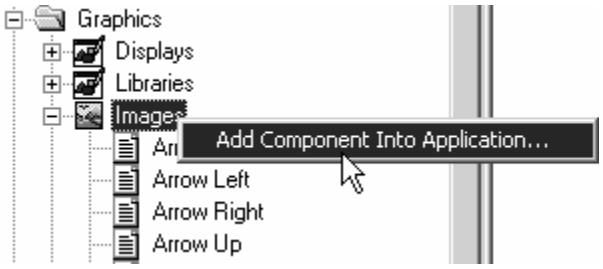
Other options on the **Arrange** menu include selecting **Send to Back** and **Bring to Front**. Use this to arrange objects when they overlap each other.

Multiple items may be automatically spaced evenly and arranged relative to each other with the **Arrange** menu.



The Image Object

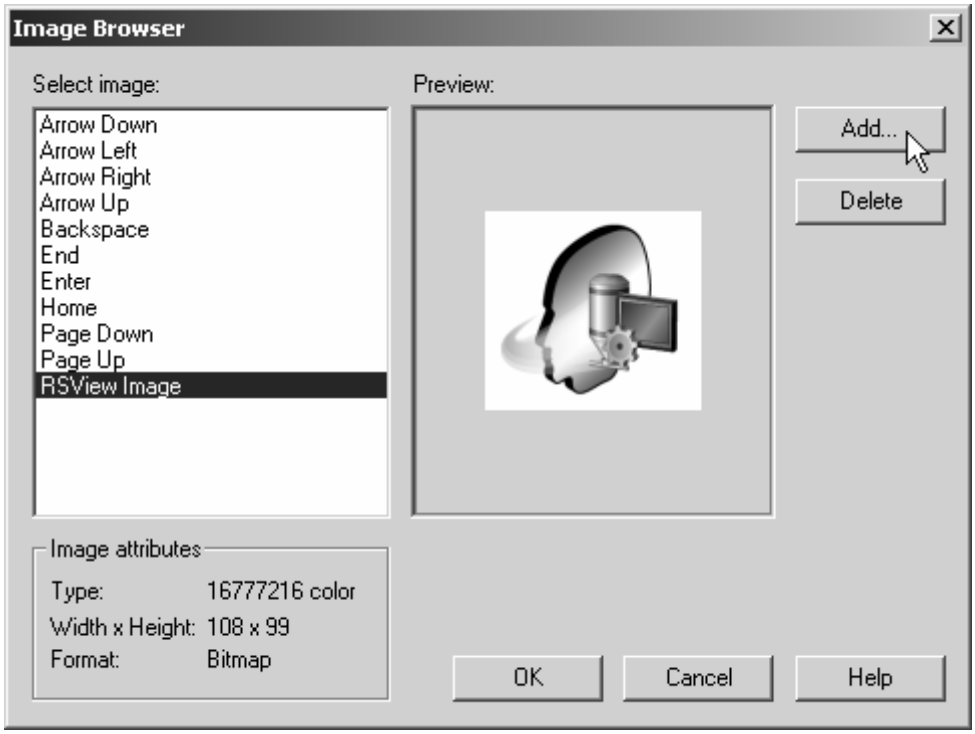
Bitmap or .jpeg images may be added to a graphic display, or placed on objects such as symbol indicators, multistate indicators or any push button. Before images can be used, they must be imported into your project. Select **Images** from the **Graphics** folder in the Project Explorer. There are a number of default images included in a new project.



Right-click on the Images icon and select **Add Component Into Project** to import other .bmp files into a project.

Using the Image Object

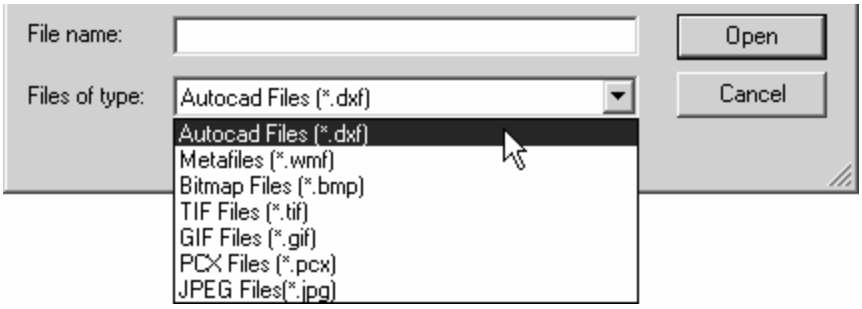
Select **Image** from the **Objects, Drawing** menu to place a bitmap image on a graphic display. The Image Browser opens to let you preview and select the bitmap or .jpeg files. You may also remove and import other image files from this browser.



Importing Other Graphic files

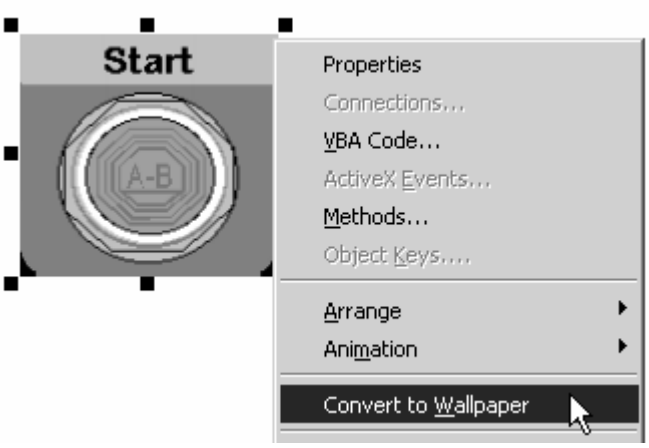
Other types of graphic files may be added to a graphic display with the **Import** command in the **Objects** menu:

- .dxf (AutoCAD files)
- .wmf (Windows Metafiles)
- .bmp, .tif, .gif, .pcx (Bitmap files)
- .jpg (JPEG files)



Converting Objects to Wallpaper

Some objects on your graphic display have no interaction with the system. An imported image, for example, may simply be part of the background. It is advantageous to convert these elements to Wallpaper. This is available from the right-click menu or the **Edit** menu.



Converting an object to wallpaper forces it to be static, locked into position. Once converted, you cannot select it or animate it. Converting objects to wallpaper can help speed up animated graphic displays because the wallpaper does not have to be redrawn each time one of the overlapping objects changes. Wallpaper objects also help in editing complex graphics – you can't accidentally select it when you don't mean to.

To convert wallpaper back to an object, use the **Unlock All Wallpaper** command from the **Edit, Wallpaper** menu.

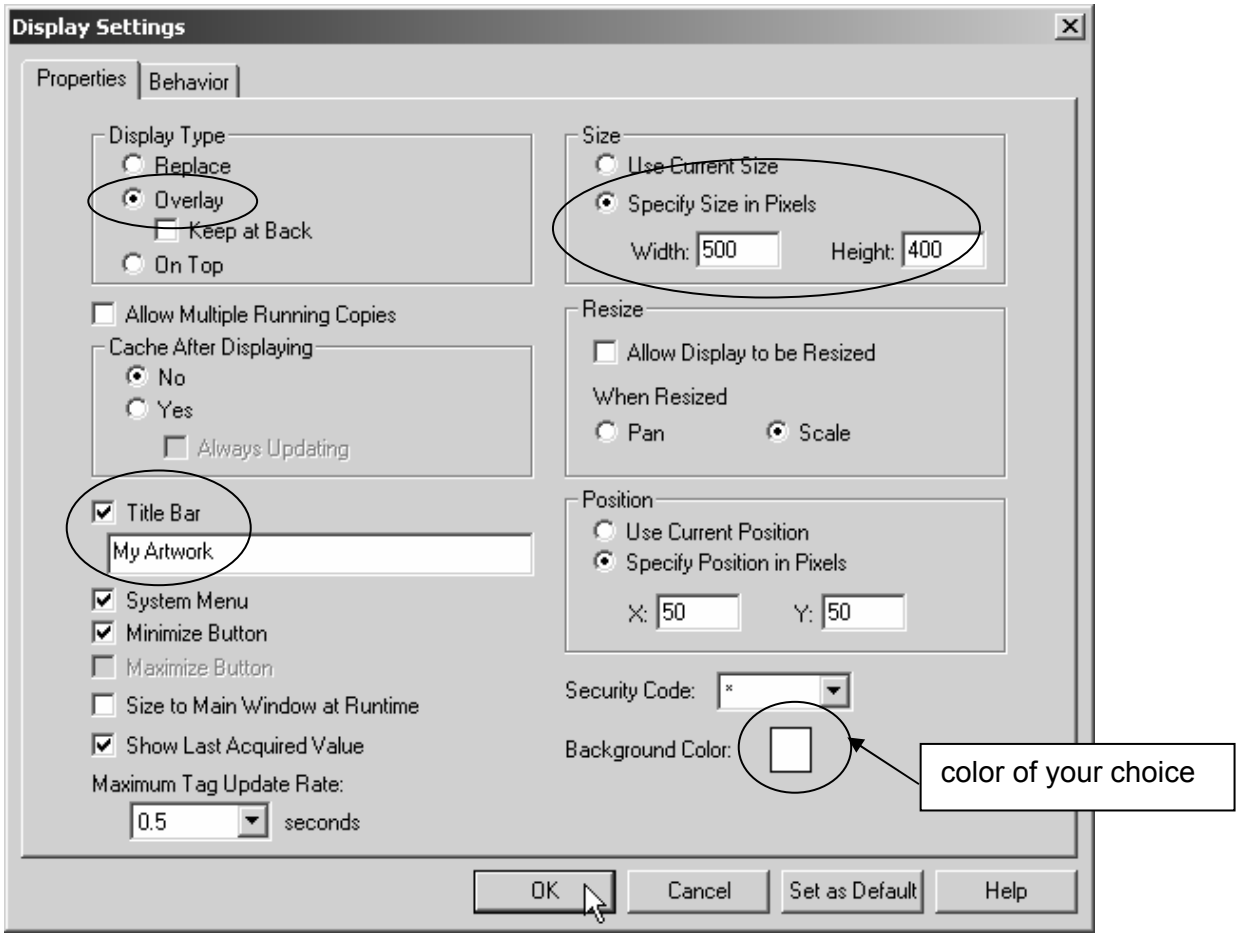
Lab 4 – Basic Graphic Display Elements

Objective: Create a graphic display and practice using Drawing objects.

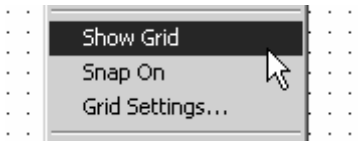
Software Requirements:

- RSView Studio

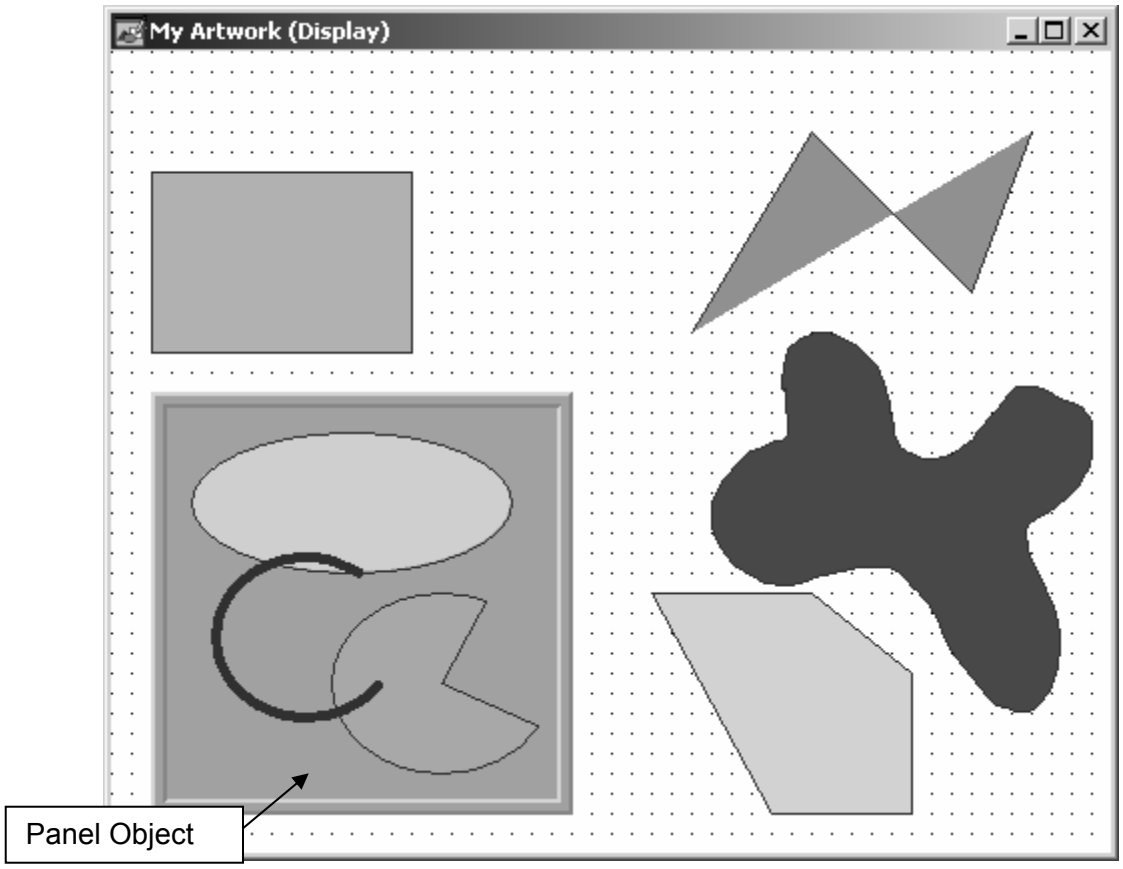
1. Create a new graphic display by one of the methods mentioned on page 5-3.
2. Choose **Display Settings** from the **Edit** menu and set following:



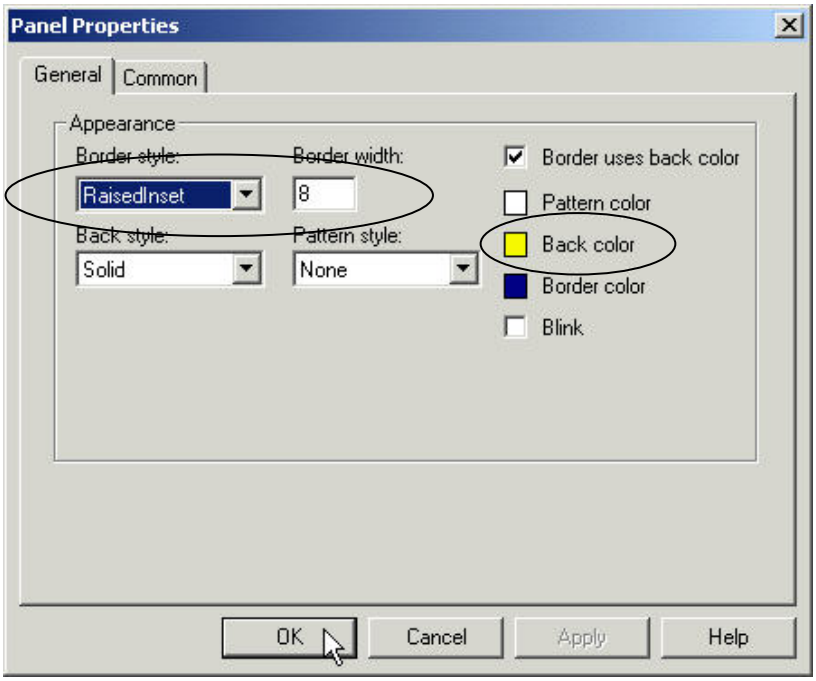
3. Save the graphic display as **My Artwork**.
4. Show the Grid, and enable the **Snap On** feature. Set these options from the Right Click menu or the **View** menu.



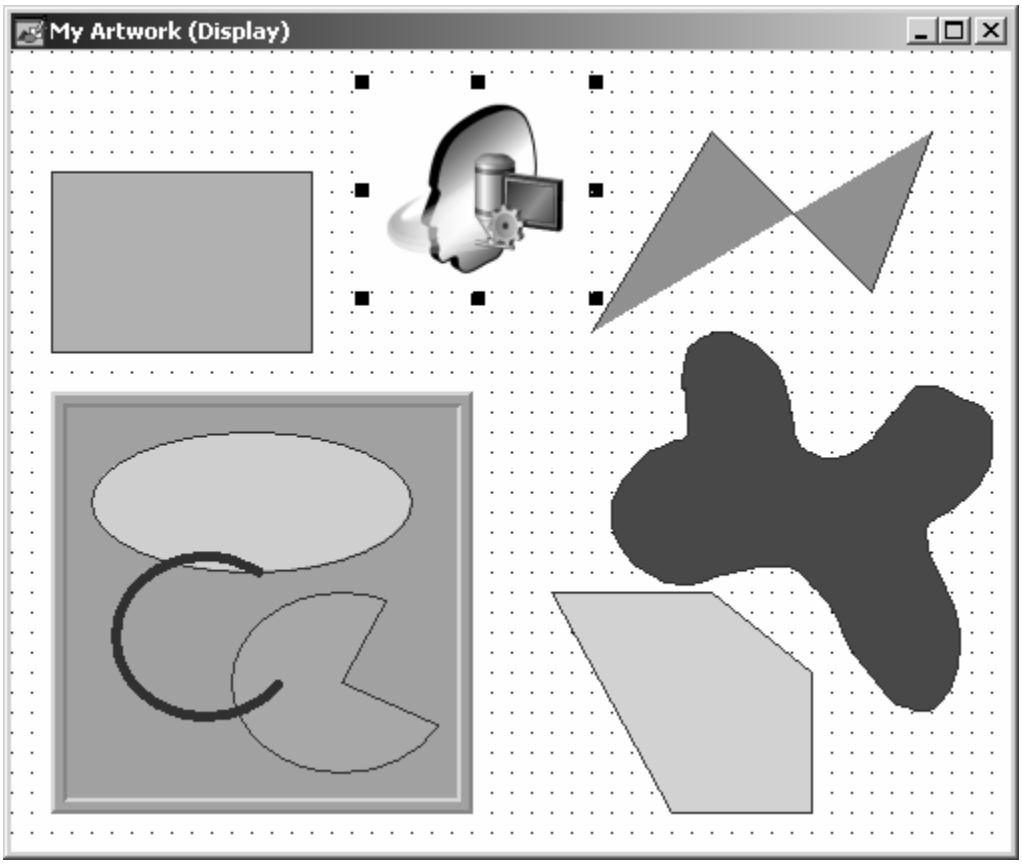
5. Draw geometry on the graphic using the **Drawing** tools in the **Objects** menu.



6. Create a Panel object to contain some of the geometry. Double-click it to edit its properties as follows:



7. Practice grouping and arranging multiple objects using the **Arrange** menu.
8. Convert some of the drawing objects to **Wallpaper**.
9. Add an Image to your graphic.
   - Right-click the **Images** icon in the Graphics folder and select **Add Component Into Project**. Browse to the **\Supervisory Edition Class Files\Images** directory and select all the graphic files. Click **Open** to import them.
   - Select **Image** from the **Objects, Drawing** menu. Draw a space for an image on the graphic. Double click the object and select the **RSView Image** from the Image Browser.

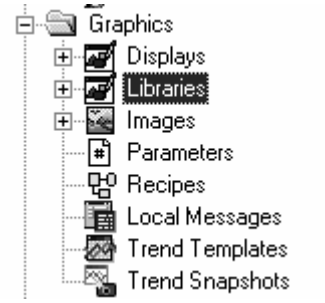


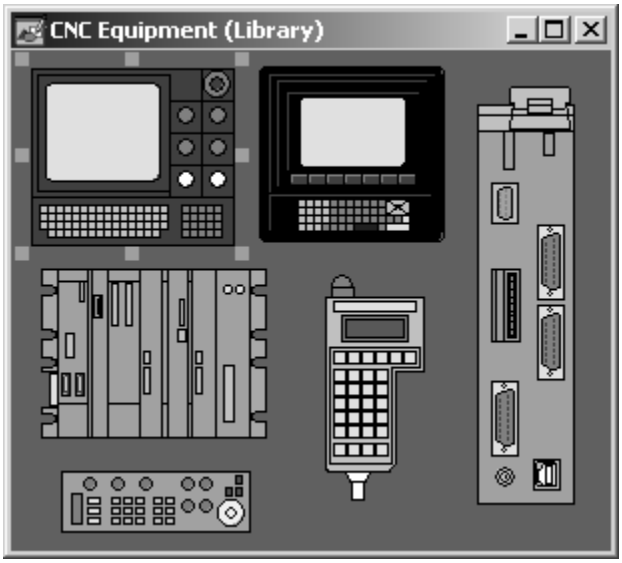
10. Save and close the graphic display.

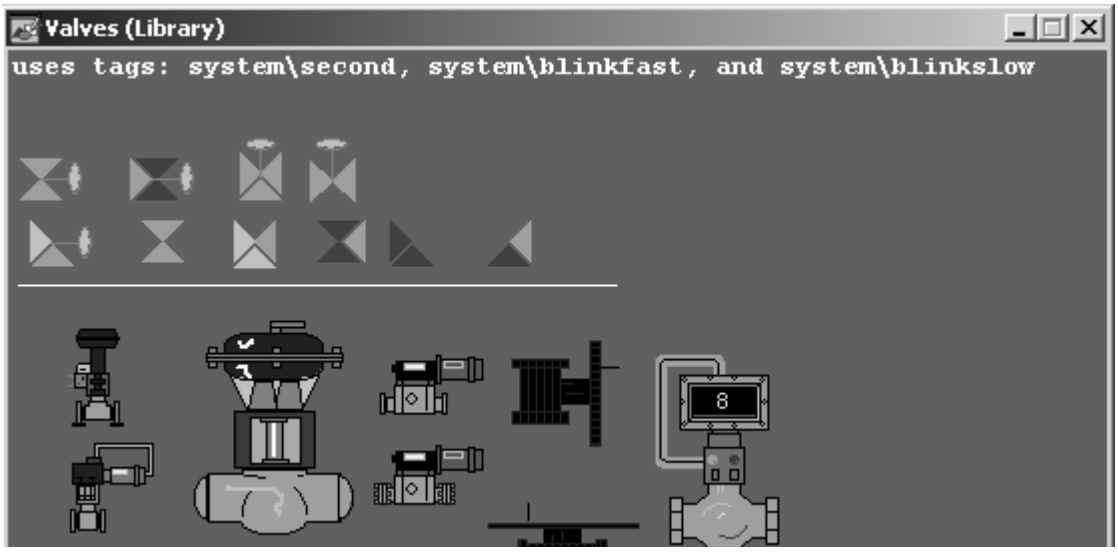
This Lab is Finished.

Adding Objects from the Graphics Library

RSView Studio comes with an extensive library of graphical objects you can copy into your graphic displays. They are located in the **Library** item in the **Graphics** folder in the Application Explorer. Some libraries are simply groups of drawing objects, while others have built-in animation.







To use an object from a library file, simply copy and paste it, or drag and drop it from the library to your graphic display.

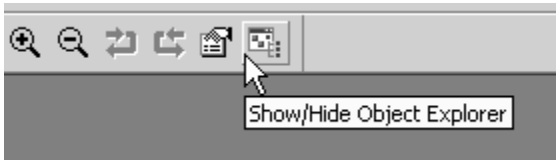
Library files are simply RSView graphic displays (*.gfx) that have been installed in a common directory on your hard drive. You may alter the files like any other graphic display file. You can create your own library files using the **New, Library** command in the **File** menu.

The Object Explorer

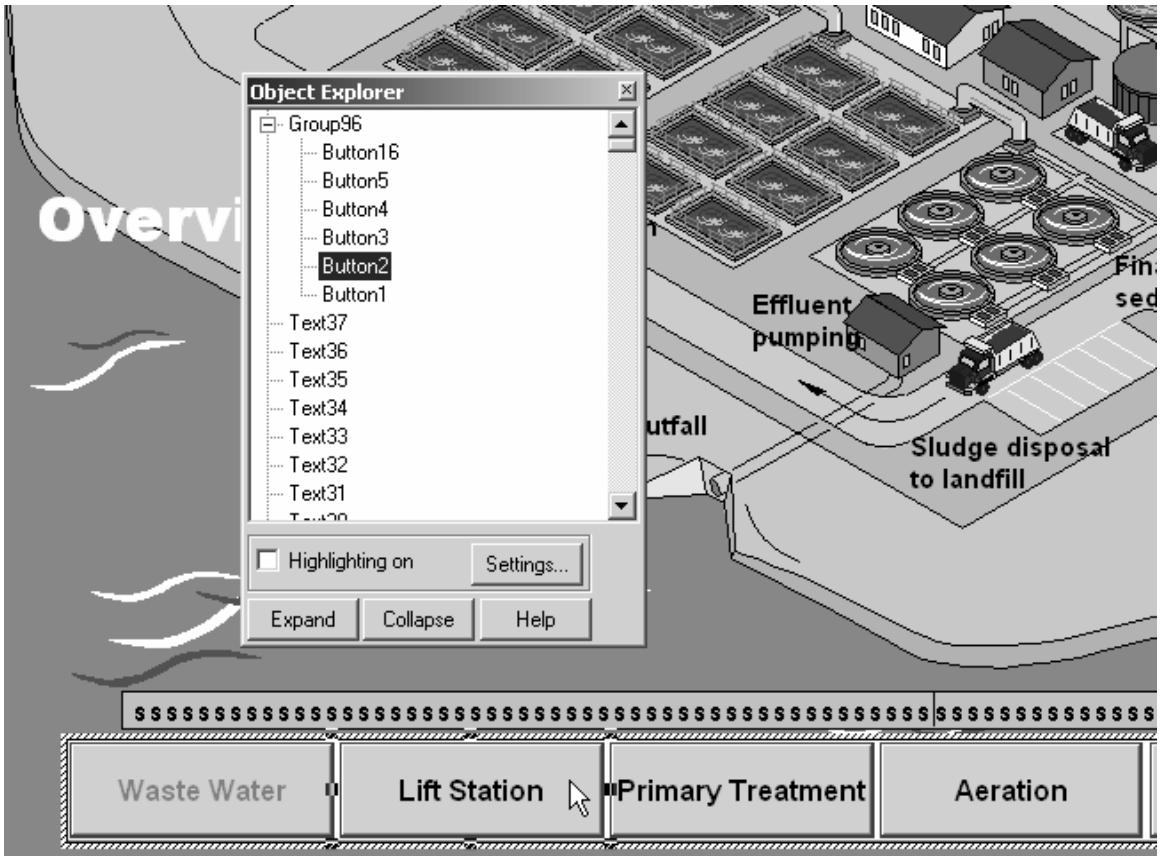
The Object Explorer tool helps in editing and troubleshooting complex graphic displays. It provides a listing of all objects in a graphic display, organized in a tree structure. Grouped objects may be expanded into their sub-elements. When you click on an object in the Object Explorer, it is highlighted in the graphic display.

Right-clicking on an object in the Object Explorer presents you with the same menu as if you had right-clicked the object in the graphic.

Show the Object Explorer by selecting it from the **View** menu, right-clicking in a graphic display, or clicking the toolbar button.



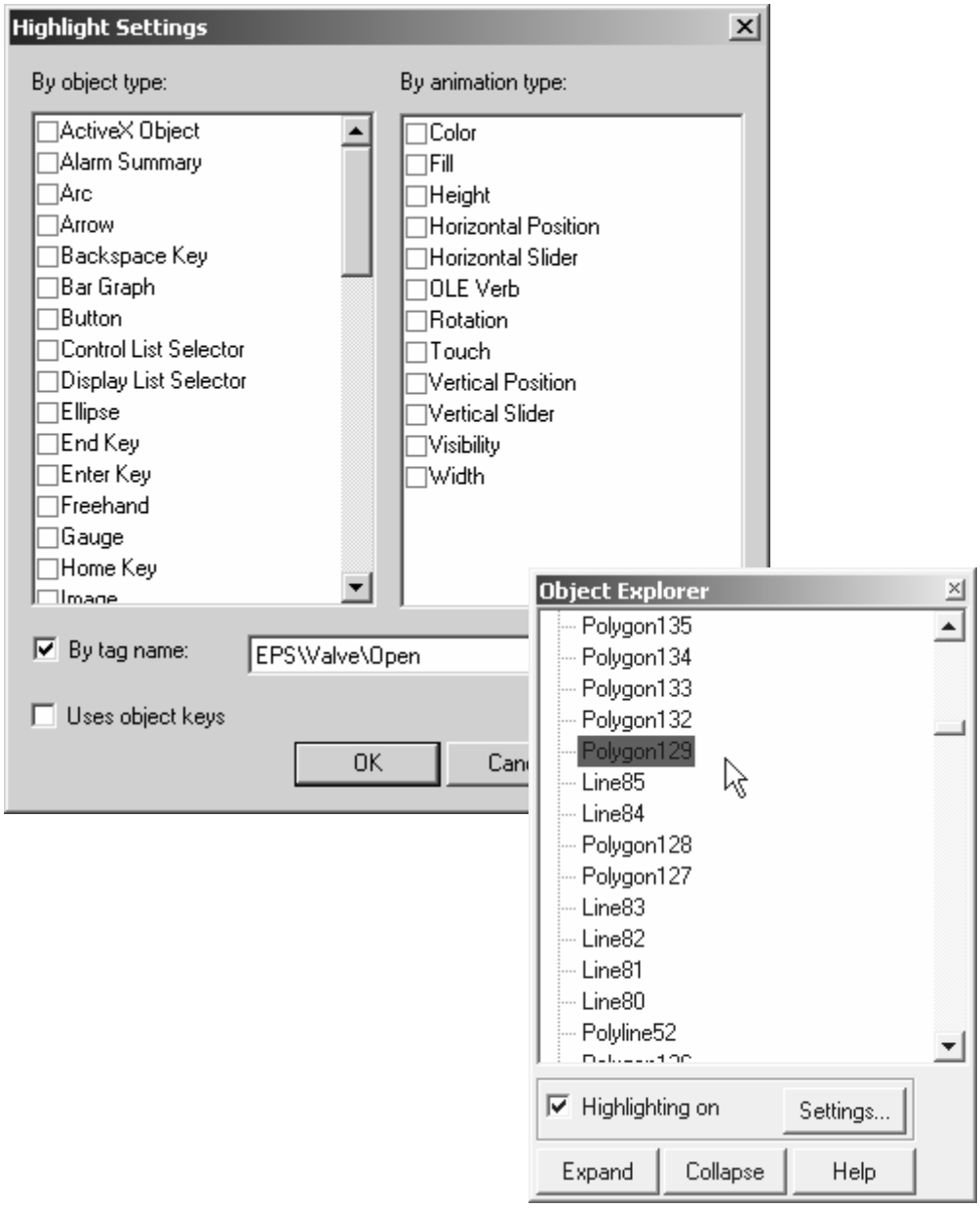
Example of the Object Explorer – Button2 (within a group) is highlighted:



Use the Object Explorer to troubleshoot existing graphics. Enabling Highlighting will highlight objects that conform to your settings. You can highlight objects by object type, animation type or tagname.

For example, you wish to see every object in a graphic that somehow uses a particular tag. Click on **Settings** in the Object Explorer, and select the tag. When you return, the object explorer will highlight all of these objects.

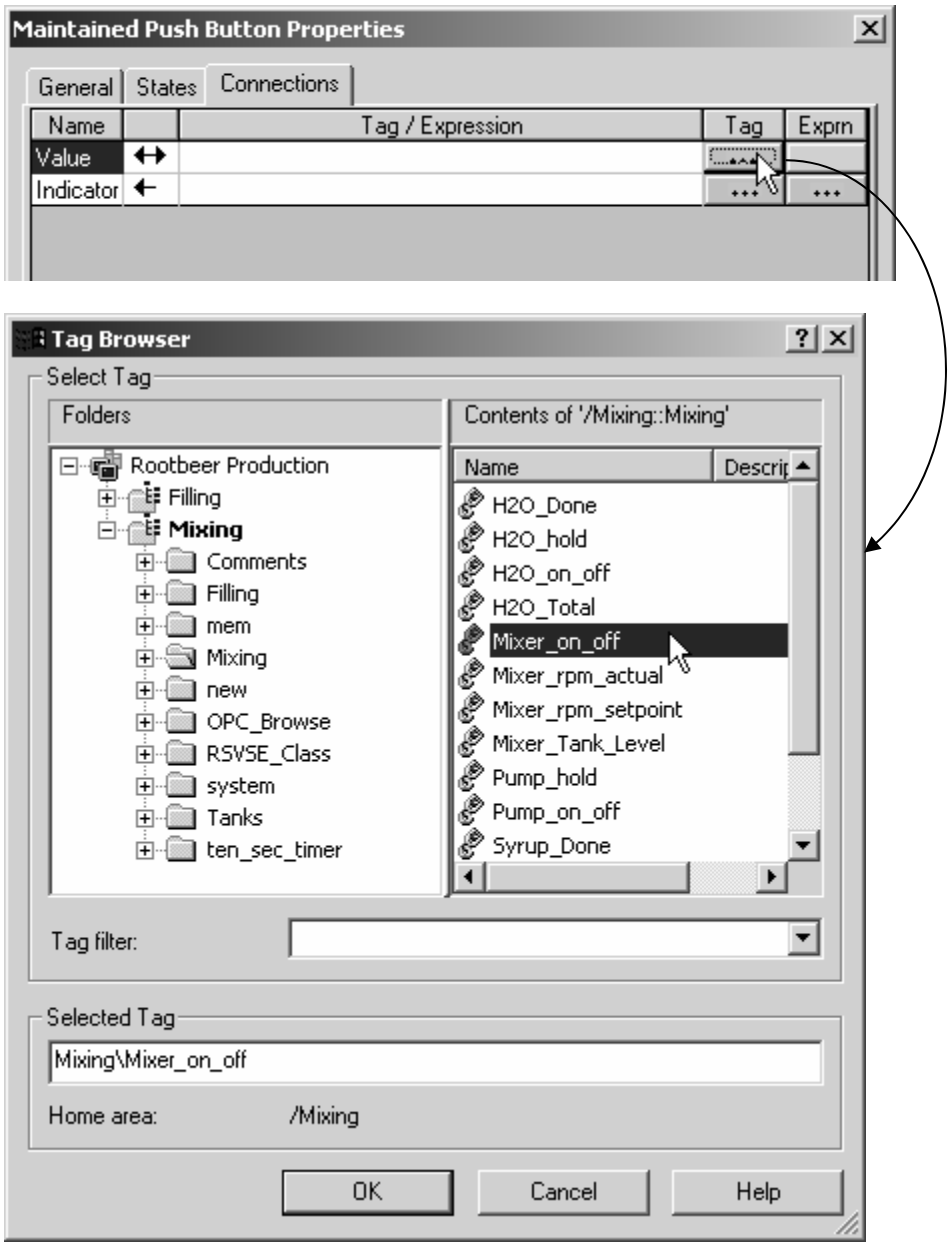
In the example below, the highlighted object, Polygon129, uses the EPS\Valve\Open tag. The object is highlighted in the graphic as well.



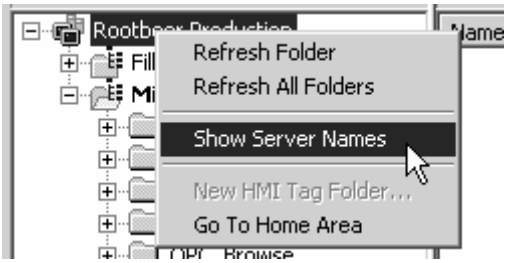
The Tag Browser

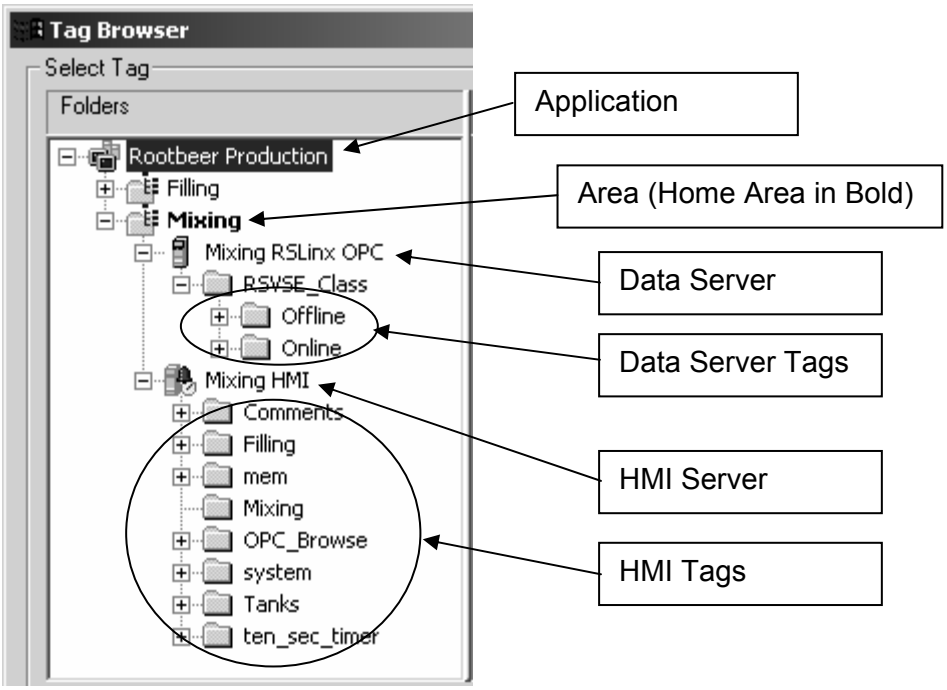
Interactive objects will read, write, and react to tag values. These can either be Data Server tags, or HMI tags. Use the Tag Browser to select any tag for an object.

For example, you wish to configure a Maintained Push Button. On the Connections tab of the properties editor, you may browse for the tag:



The tag browser shows all Data Server and HMI tags. To separate the two, right click in the folder area and choose **Show Server Names**.





Select tags from the right pane of the browser.

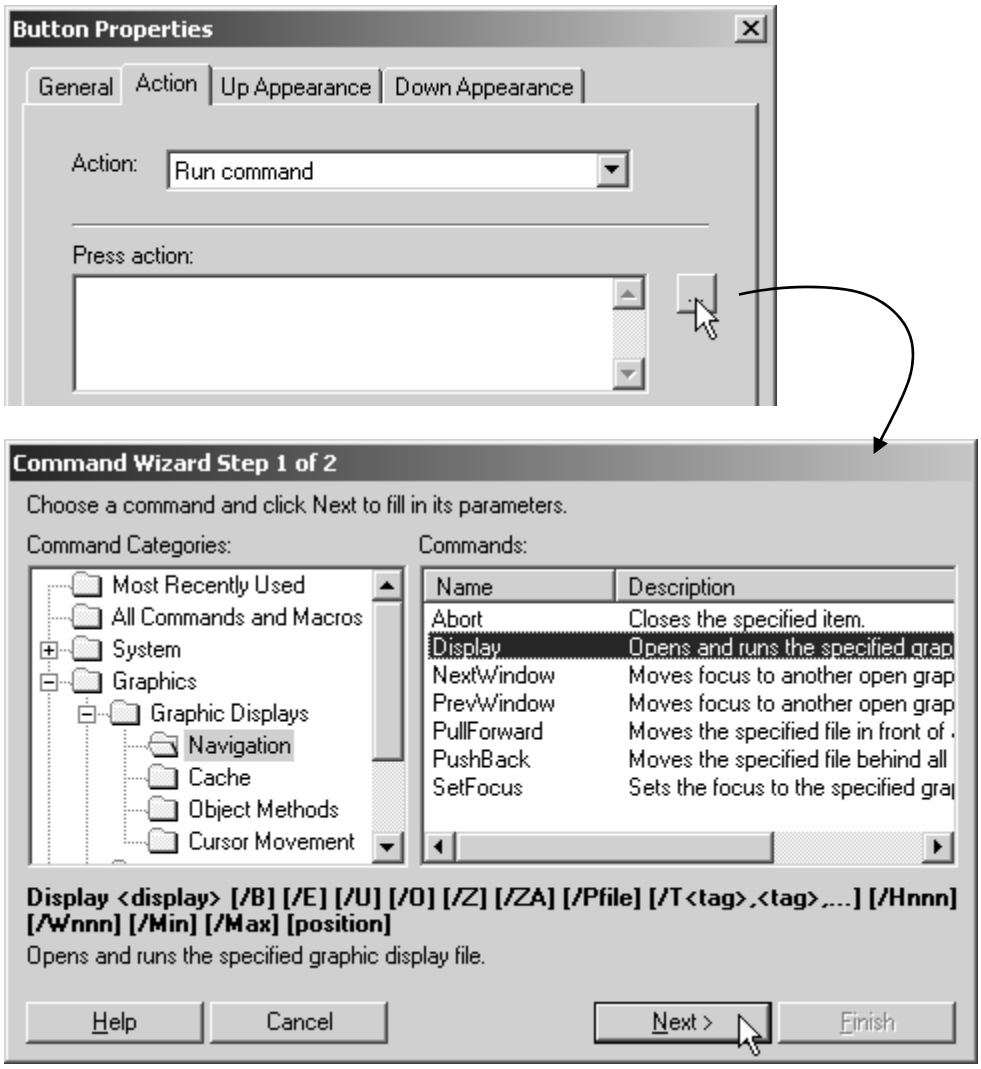
You may create new HMI Tags and Tag Folders from the right click menu in the Tag Browser.

The example above is for a distributed application with two HMI Servers, each in their own Area.

RSView Commands

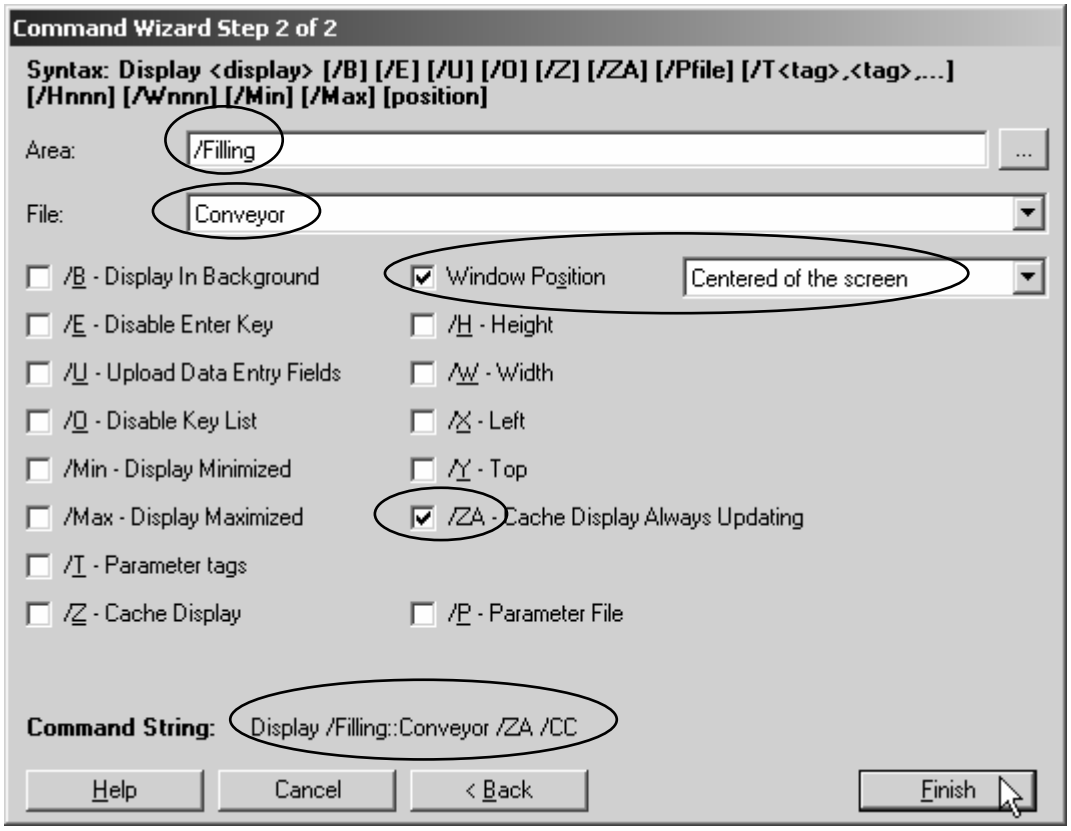
RSView commands are a means of controlling how your application acts. For instance, for an operator to open a graphic display, she might press a button on the screen. The button is configured to issue the **Display** command.

The command wizard is always available to automate the building of a command.



Commands may have switches available to effect how they act.

This command will open a graphic display named **Conveyor** which resides in the **Filling** area. It will center it in the middle of the screen, cache the display to memory and always update it.



As you add the switches, the command line is built

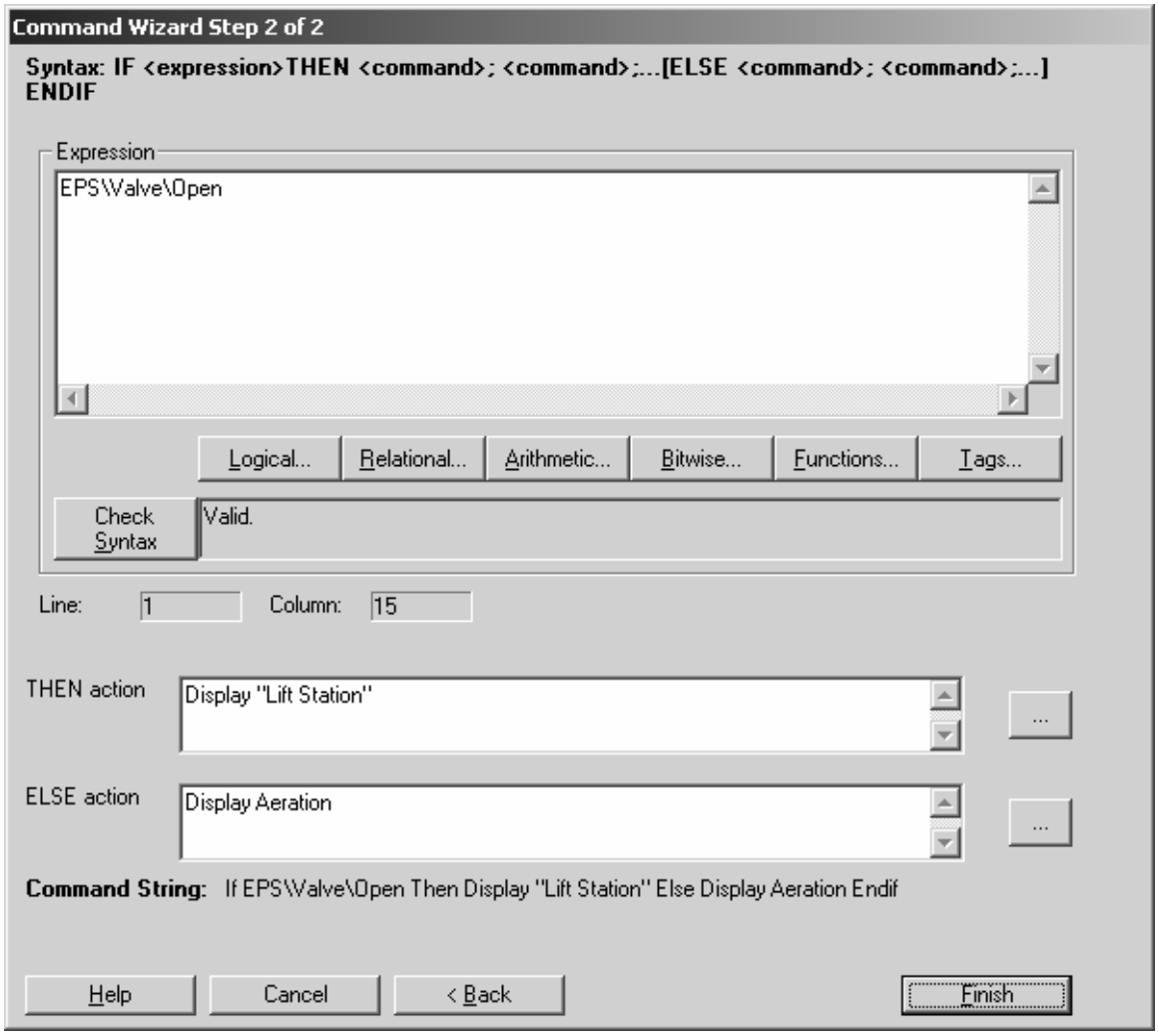
```
Display /Filling::Conveyor /ZA /CC
```

Note – closed quotes are required (and added by the wizard) around the area and display name if spaces are in the name:

```
Display “/Filling::Conveyor 1” /ZA /CC
```

Executing Conditional Commands

The **IF** command allows IF-THEN-ELSE logic to be applied to a command. For example, a pushbutton may execute the following:



Upon an operator pushing the button, the tag EPS\Valve\Open is evaluated. If the tag resolves true (1), the Lift Station display is opened. If the tag resolves false (0), the Aeration display is opened.

Using Placeholders in Commands

You may use a tag placeholder to replace a tag reference with its *current value* when the command is evaluated.

To create a tag placeholder, enclose the tag reference in dollar signs ($). If the tag placeholder is enclosed within double quotes, or nested in the string value of another tag placeholder, RSView does not substitute the tag value.

Examples:

For the following examples assume that the HMI project contains the following tag references with the following values:

Tag1 = 1
Tag2 = 2
Tag3 = 3
Tag4 = "Screen2"

The following commands are executed:

Example 1

```
Display Screen$Tag1$
```

Result: Replaces $Tag1$ with the tag's value "1", then executes the command:

```
Display Screen1
```

Example 2

```
Display $Tag4$
```

Result: Replaces $Tag4$ with the tag's value "Screen2", then executes the command:

```
Display Screen2
```

Relative and Absolute Referencing

Examine the following example of issuing the **Display** command. The display is referenced with its name and path. This is an **absolute reference**.

```
Display /Filling::Conveyor
```

Had the display resided in the **home area** (the area in which the command is to given), the specification of the area in not necessary. If no area is given, the home area is assumed. This is a **relative reference**.

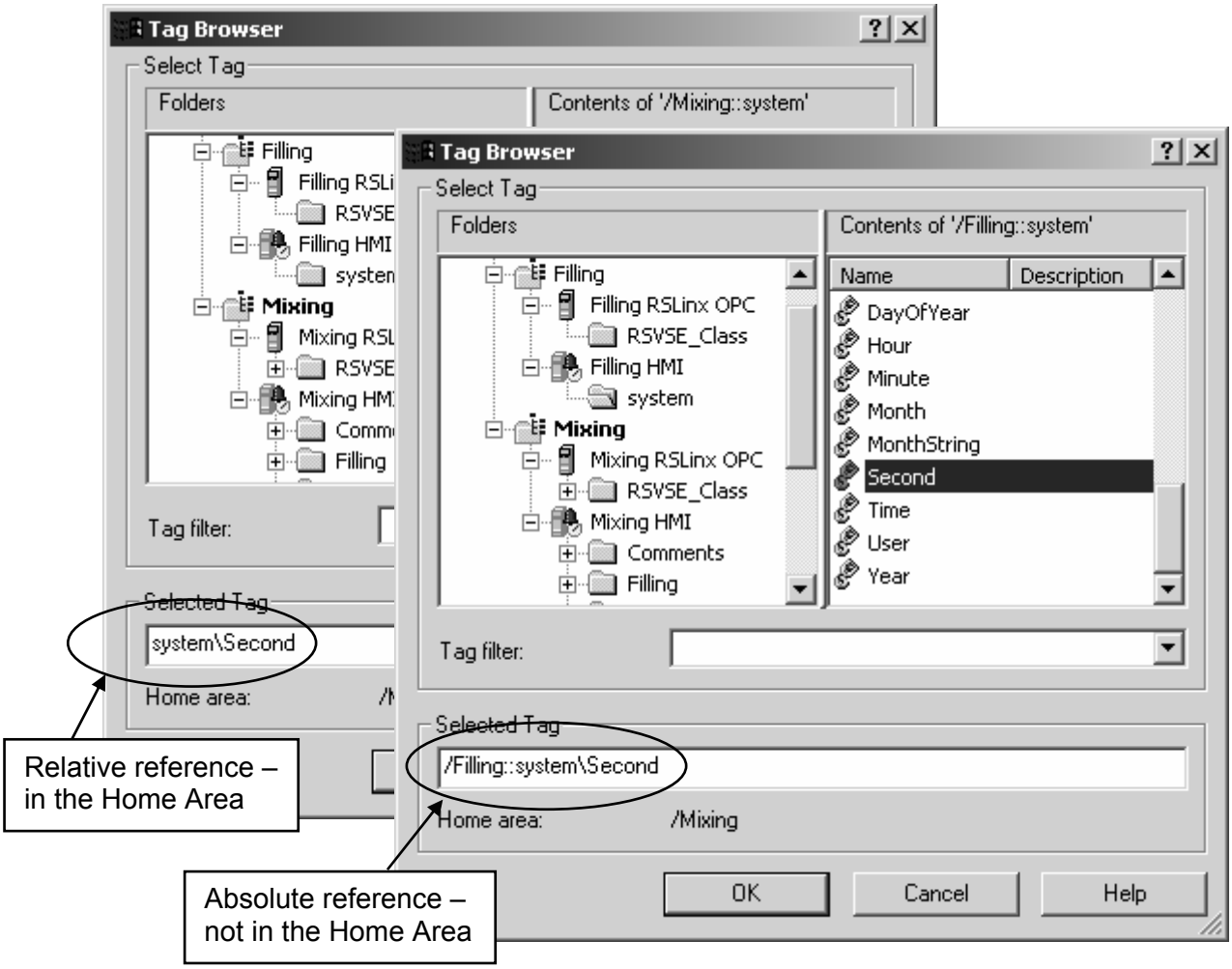
```
Display Conveyor
```

You will reference graphic displays and tags in your application.

The syntax is:

Area names are preceded with a forward slash (`/`)
Areas and elements (tags or displays) are separated with two colons (`::`)

The Tag Browser will automatically use the correct referencing:



Tag Substitution

Tag Substitution allows you to quickly replace tags used in your graphic displays. The Tag Substitution tool allows you to replace:

- A Tag Name, or part of a tag name
- An HMI Tag Folder Name
- Text in an Expression

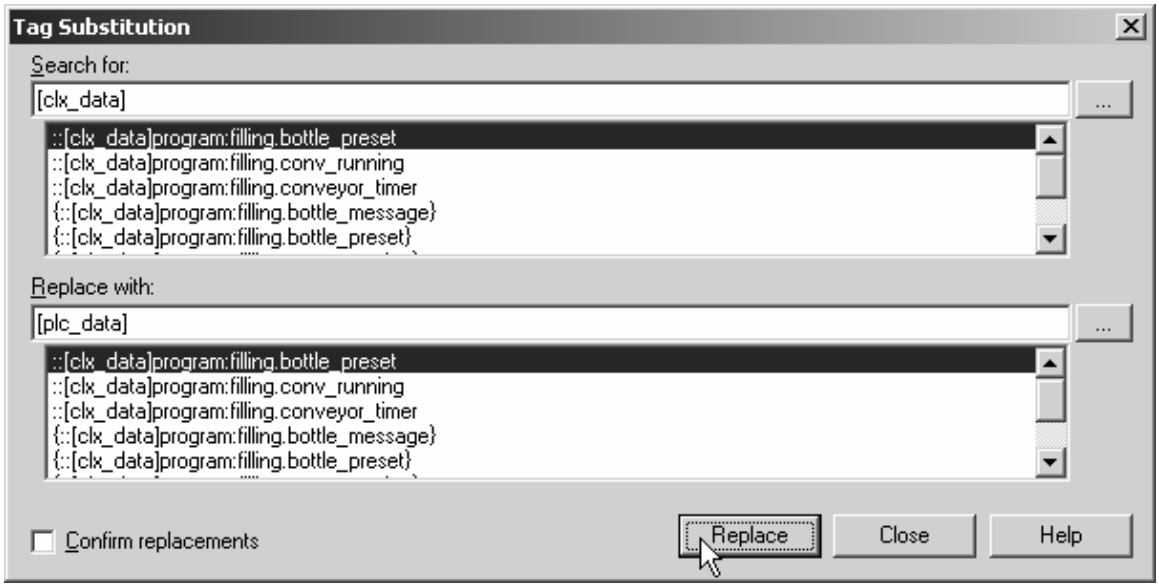
For example, if you have a graphic with a tag called TankLevel used in an object, you could replace it with a tag called TankVolume.

Open the Tag Substitution window by right-clicking on and object, selecting **Tag Substitution** from the **Edit** menu, or by using the Ctrl-R keyboard shortcut.

Select the objects you wish to replace tags in. Open the Tag Substitution window. Select the tag or part of tag you wish to replace in the top field. Select what you want to replace it with from the bottom field. Use the browse button to open the Tag Browser.

Tag Substitution can be very helpful if you are duplicating elements on a graphic display and then changing the tags. Parts of directly referenced tags may be substituted all at once.

For example, you can select every object on a graphic (CTRL-A), bring up Tag Substitution (CTRL-R) and replace only the OPC topic portion of the direct reference tag address. This will convert all tags to the new OPC topic reference at once.



The Expression Editor

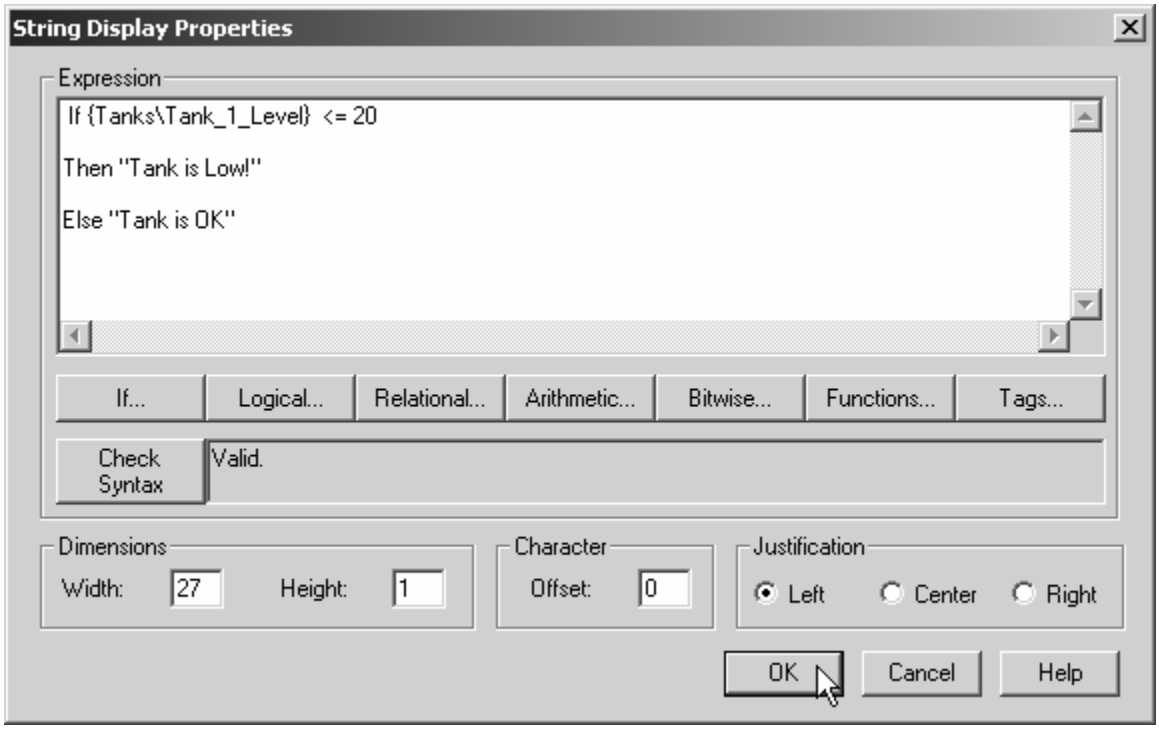
You may wish to display not just the value of a Tag, but an expression instead. An expression allows you to manipulate tag values using:

- Arithmetic operators (+,-,/,*,**,MOD)
- Bitwise operators (AND, OR, XOR, shift left, shift right, complement)
- Relational operators (<, >, =, ≥, ≤, ≠)
- Logical comparisons (AND, OR, NOT)
- If-Then-Else statements
- Functions (see next page)

The Expression Editor is available in many RSView objects.

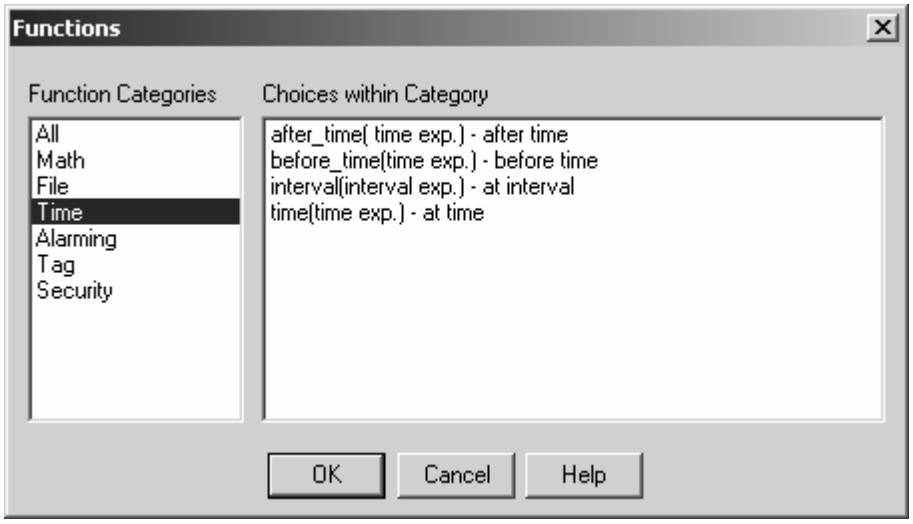
- graphics
- derived tags
- events
- data log setup
- command line

The following example of how an expression might be used to control the value of a String Display Object:



Note: Tag names containing an underscore (Line_1_Start), a dash (Line-1-Start) or starting with a number (1LineStart) must be enclosed with curly brackets. Selecting tags with the Tag Browser will automatically apply the curly brackets.

Functions within the Expression Editor



Use the functions in the expression editor to customize and automate objects.

For example, the interval function (above) will return a 1 (true) when the time specified has elapsed. Use this in an Event File (covered later) to automate a task that you wish to happen periodically.

Interactive Objects

Many objects allow interaction with the RSView Tag Database. These allow both control (setting the value of a pump speed, for instance) and display (monitoring multiple tank levels in a bar graph).

Interactive Objects include:

Embedded Variables: Embedded variables allow you to display values that change dynamically at run time. At runtime, a placeholder is updated with the real-time values of the variables.

Push buttons: objects that are typically used to start or stop processes or actions. Numeric and string: objects for entering or viewing numbers or text in a graphic display.

Indicator: objects that allow an operator to make a selection from a number of possible choices, all of which are visible at once.

Gauge and graph: objects that show the range of values, and relationships between variables.

Key: objects that represent keys on a keyboard, and are for use with touch screens.

Advanced: objects, such as trends and alarm summaries, that allow you to view and analyze the data in your system.

OLE objects: objects such as spreadsheets, charts, or text produced by other Windows applications. The types of OLE objects that are available depend on the software installed on your system.

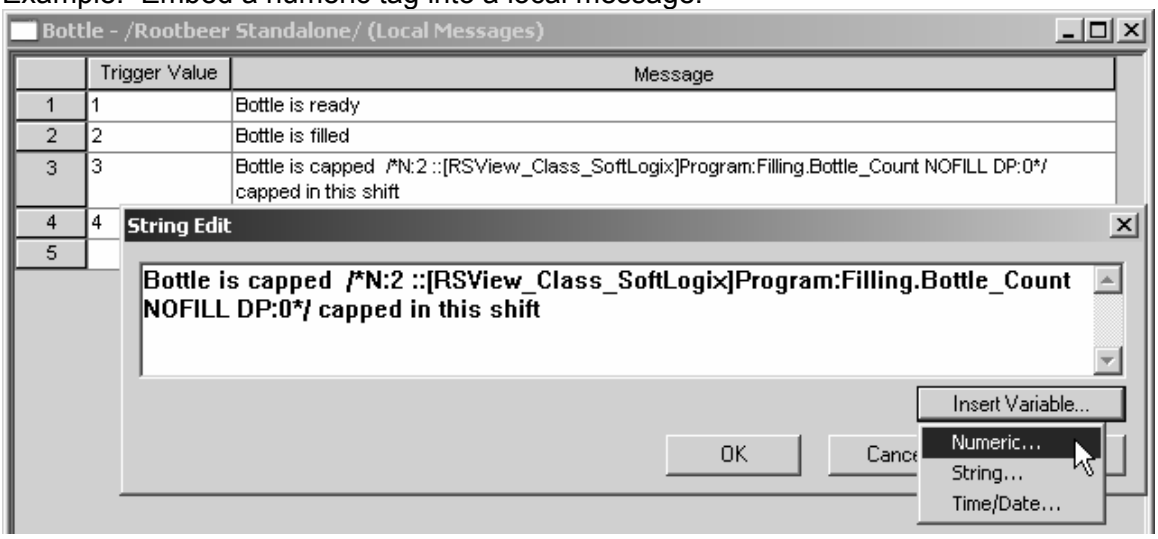
ActiveX objects (formerly called OLE custom controls or OCX): control objects such as gauges, sliders, and buttons, and objects you create yourself using a tool like Visual Basic. These objects allow an external action, such as a mouse click, to initiate an action within RSView. The ActiveX objects that are available depend on the software installed on your system.

Embedded Variables

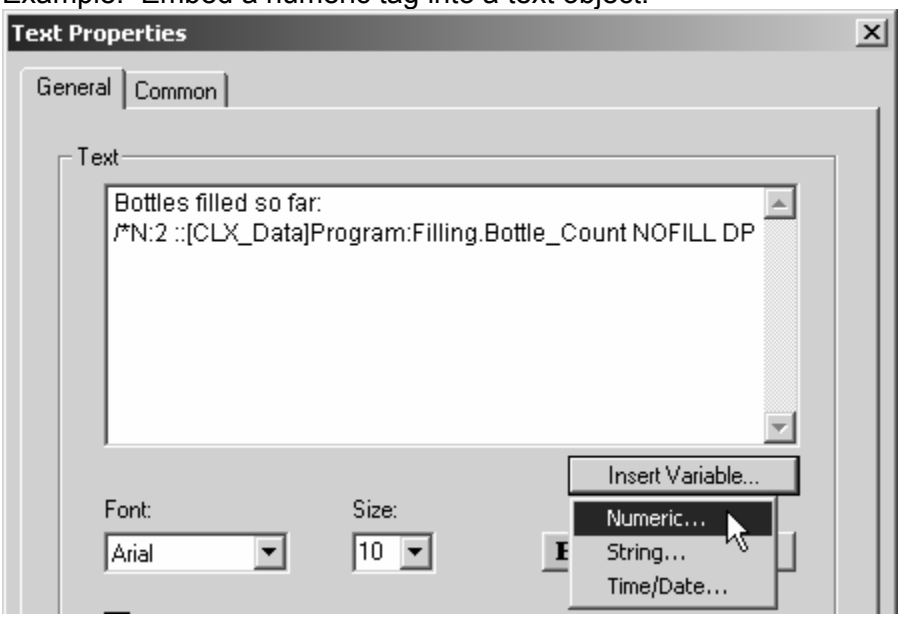
Embedded variables allow you to display values that change dynamically at run time. You put placeholders in strings where the embedded variable will be displayed. At runtime, the placeholder is updated with the real-time values of the variables. You can embed tag values (Numeric or String), date values and time values.

You can use embedded variables in the text captions on graphic objects, and in message text, and you can use multiple embedded variables in the same caption or message.

Example: Embed a numeric tag into a local message.

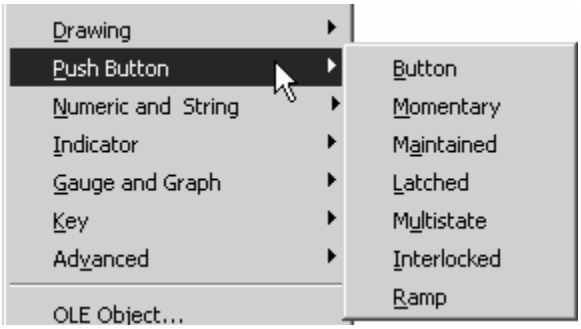


Example: Embed a numeric tag into a text object.



Push Button Objects

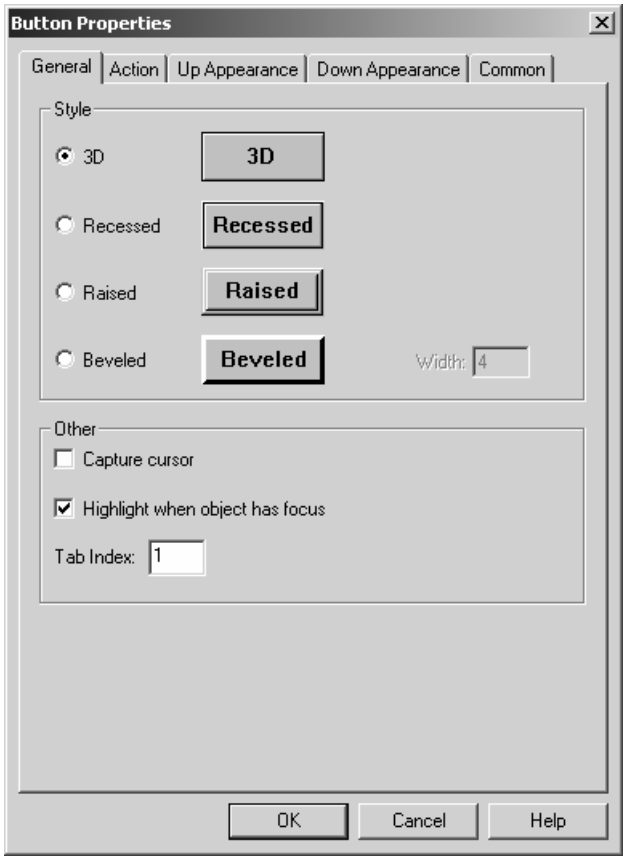
There are seven different push buttons available:



Button – The Button object provides a method of running an RSView command. Activities such as navigating to other graphic screens, setting the value of tags, controlling the logging of data and logging in and out are all achieved by running a command.

All commands are listed and explained in Appendix A of the User's Guide (Help, Online Books, User's Guide)

The Button Properties dialog box When you place a button object on a graphic.



General Tab – Configure how the button will look. Choose a style for the button's appearance.

If you choose to **Capture Cursor**, the cursor will be trapped on the button after a press action. This ensures that the button is released. Use this to guarantee that both a press and release action will occur.

Common Tab

Some properties, such as size and position, are common to all graphic objects. These properties are set up through the Common tab in the Properties dialog box.

Up Appearance Tab

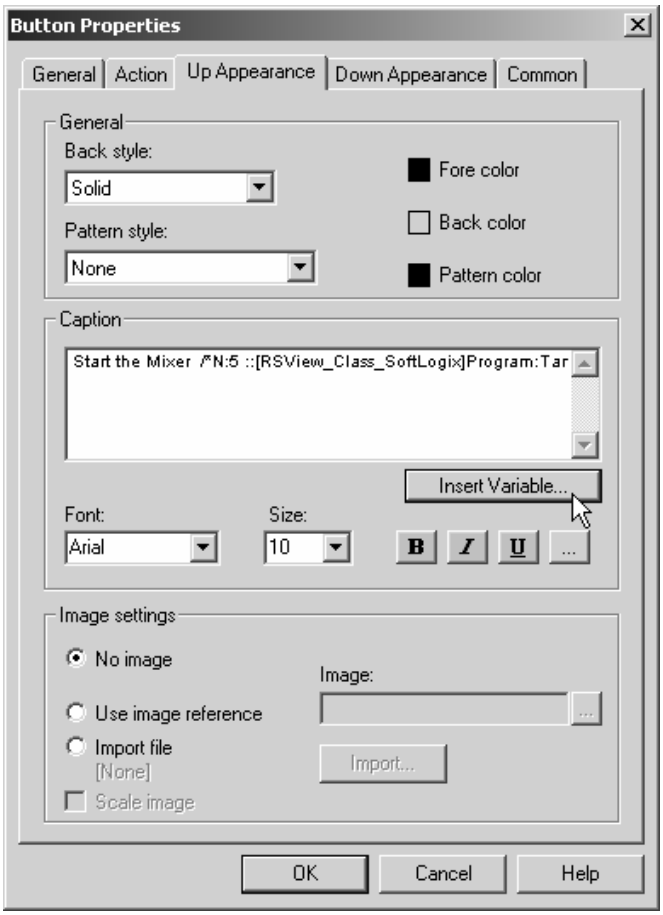
Specify what the button will look like when it is not in its pressed position.

Enter a caption for the button. The caption is displayed in the center of the button. If it is longer than the width of the button, the caption is truncated at either side. If you have added an embedded variable to the caption, the embedded variable syntax appears in the Caption box, but the text of the variable appears on the face of the object.

Down Appearance Tab

Specify what the button will look like when it is in its pressed position.

By default, it will have the same properties as the Up Appearance.



Action Tab

Choose an action for this button:

Run Command is the default setting.

Set Tag to 1

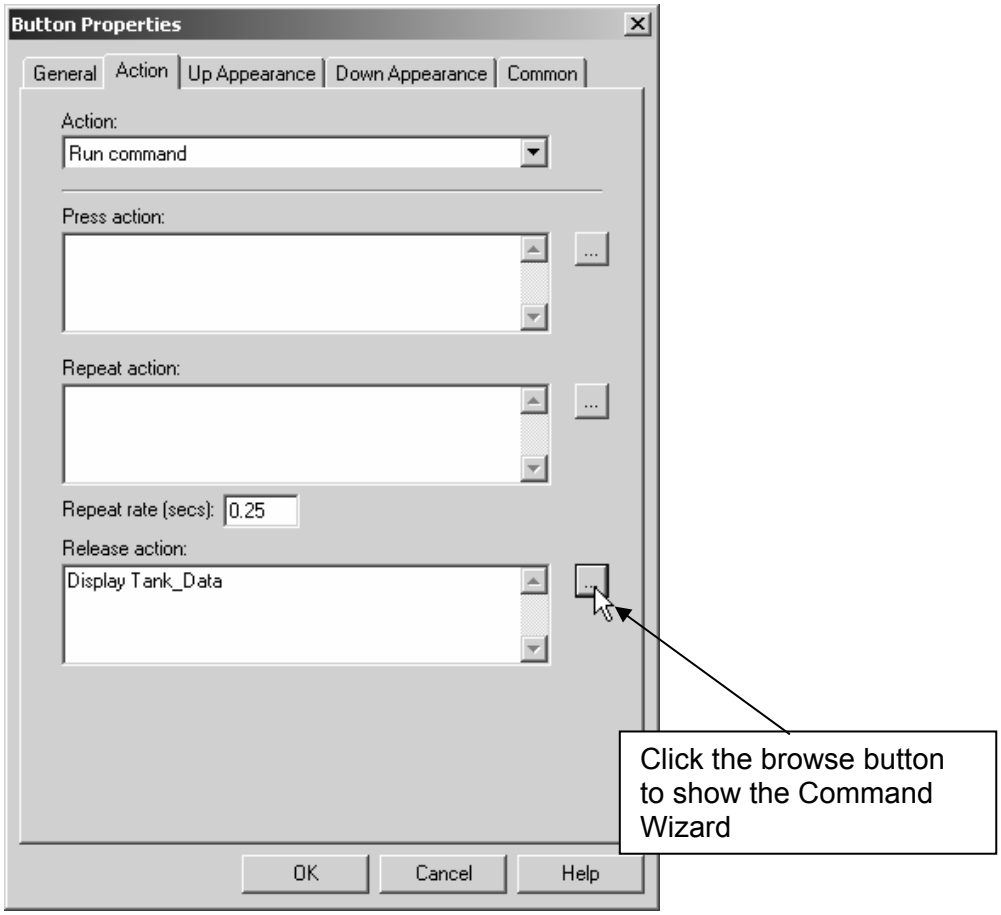
Set Tag to 0

Toggle tag value

Set tag to 1 on press and to 0 on release

Set tag to 0 on press and to 1 on release

It is good practice to issue a single command from the **Release** action rather than the **Press**. This allows an operator to move off of a pressed button without running the command if he had pressed it by mistake.



Other Push Buttons

The rest of the push buttons perform a specific task, and don't use RSView commands. Their configuration is different from the **button** object.

Momentary When the operator presses the button, it changes from State 0 to State 1 and sends the State 1 value to the data source. When the operator releases the button, it changes from State 1 back to State 0 and sends the State 0 value to the data source.

Maintained This button works like a hard-wired switch. When the operator first presses the button, it changes from State 0 to State 1 and sends the State 1 value to the data source. When the operator presses and releases the button a second time, it changes from State 1 back to State 0 and sends the State 0 value to the data source.

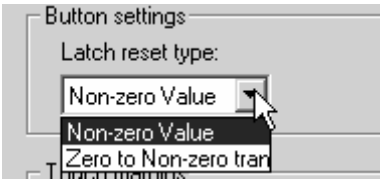
Latched When the operator first presses the button, it changes from State 0 to State 1 and sends the State 1 value to the data source. The button retains this value until unlatched by the Handshake control.

Unlatching the button:

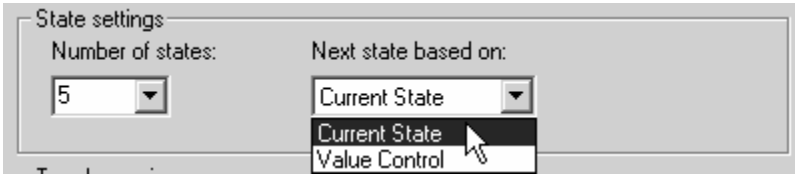
If the latch reset type (specified in the General tab of the Latched Push Button dialog box) is "Non-zero," when the Handshake control is a non-zero value, the application unlatches the button. If the operator presses the button while the Handshake control is a non-zero value, the button remains unlatched.

If the latch reset type is "Zero to non-zero transition," when the Handshake control changes from 0 to a non-zero value, the application unlatches the button.

If the button is in the latched state and the operator presses the button, the application writes out the latched (State 1) value again.



Multi-State When the operator first presses the button, it changes from State 0 to State 1 and sends the State 1 value to the data source. When the operator presses the button a second time, it changes from State 1 to State 2 and sends the State 2 value to the data source. Thus the state is incremented by one for each button press. When the button is in the last configured state and the operator presses it, it changes to State 0 and sends the State 0 value to the data source. Up to 256 states may be assigned to the button.



The action of the Multi-State push button depends on how the “Next state based on” field is set.

- Current state - the application switches the button from the current state to the next state and writes out the next state value.

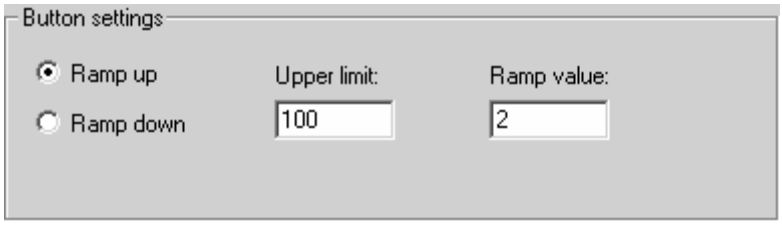
- Value control - the application reads the value of the Value control, and, if the value matches one of the button’s state values, changes the button to the next state and writes out the next state value. Select this option if you want the button to base its state on external changes to the Value control. If the value does not match one of the button’s state values, the application changes the button to State 0 and writes out the State 0 value.

Note: If you use the auto-repeat function for this button, the application uses the last value written out to determine the next value to write out, regardless of the "Next state based on" setting.

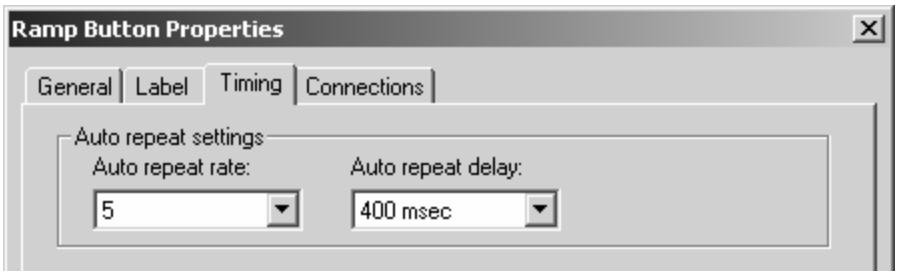
Interlocked An interlocked push button is one of a group of buttons that have the same control tag. The buttons function together in much the same way as Microsoft Windows option buttons: pressing one cancels the others and makes a new selection. Although interlocked push button function as a group, you add them to the screen one at a time.

When the operator presses an interlocked push button, it changes from State 0 to State 1 and sends the Button Value to the data source. When the operator presses another interlocked push button, it changes from State 0 to State 1, sends its Button Value to the data source, and the first button is set back to State 0.

Ramp A ramp changes a tags value by a given increment. When the operator presses the ramp button, the application reads the Value control value, stores a local copy of the value, adds or subtracts the ramp amount from the local value, and writes the result to the Value control at the data source.

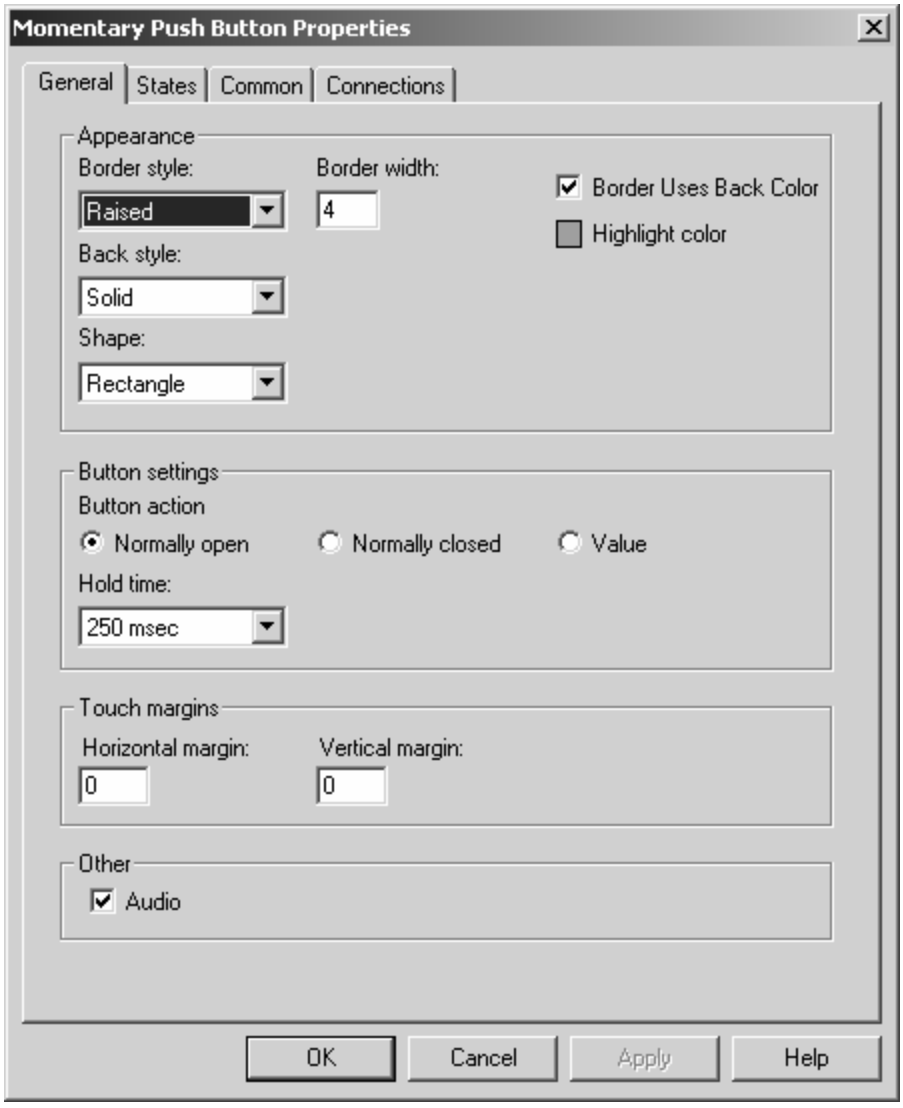


Configure the auto repeat function under the Timing tab to allow an operator to hold down the button and have it increment continuously. Use ramp buttons in pairs to create a raise and lower control.



Configuring Push Buttons

Each push button varies in its setup parameters, but they all have many items in common. Double-clicking on a push button brings up the properties:



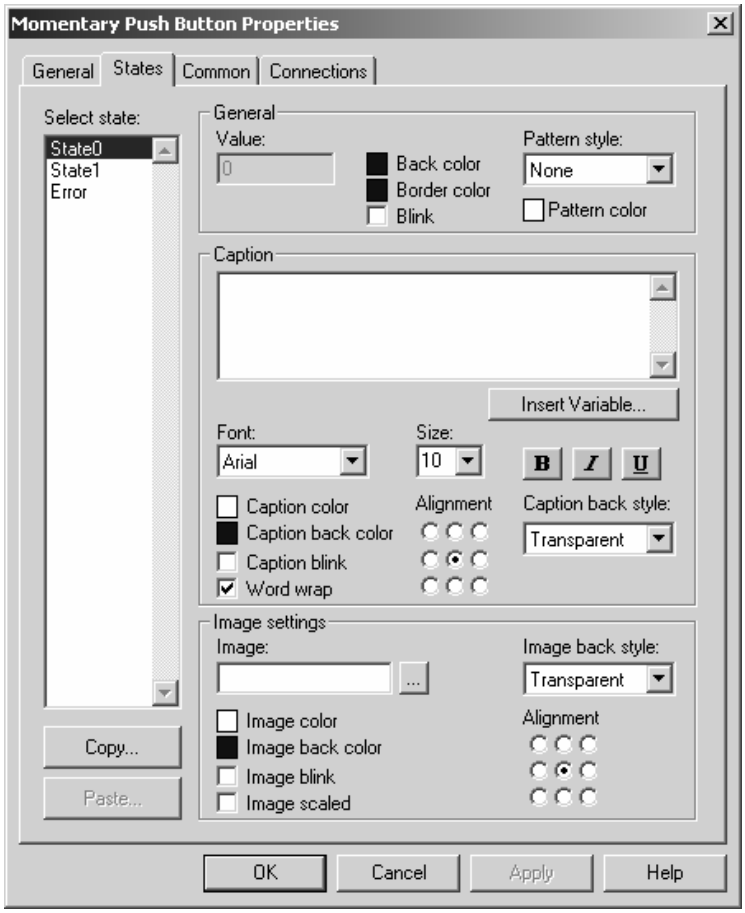
General Tab

Assign general appearance settings (color, highlight, border etc…) here.

Each button type will have its own unique settings on this tab.

Touch Margins allow you to set touch-insensitive areas inside the push button object. This is useful for buttons positioned closely together.

If Audio is checked, the computer's internal beeper will sound when the button is pressed. Note – the Allen-Bradley RAC6182 has no audio capability.



States Tab

Depending on the push button type, many states may be assigned to it.

Configure each state, including caption, colors and image, if any.

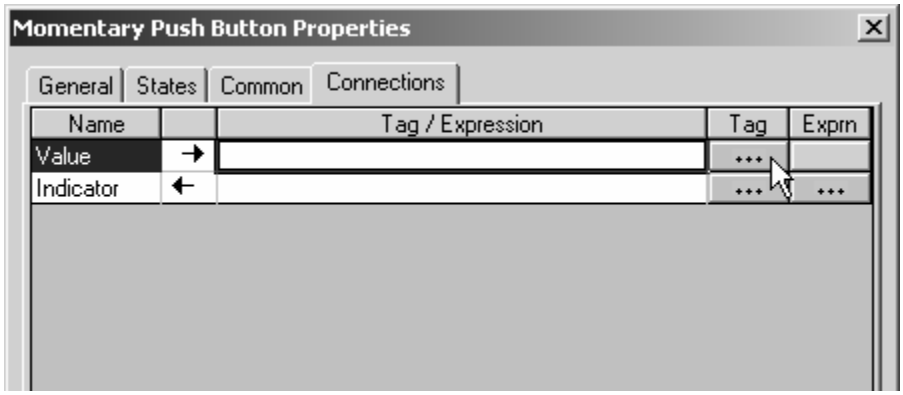
State settings may be copied and pasted onto other or all states.

Common Tab

Some properties, such as size and position, are common to all graphic objects. These properties are set up through the Common tab in the Properties dialog box.

Connections Tab

Define the connections to the Tag Database on this tab. Each push button will have a Value field. The arrows next to the name indicate the flow of data:



→ Write control

← Read control

↔ Read-Write control

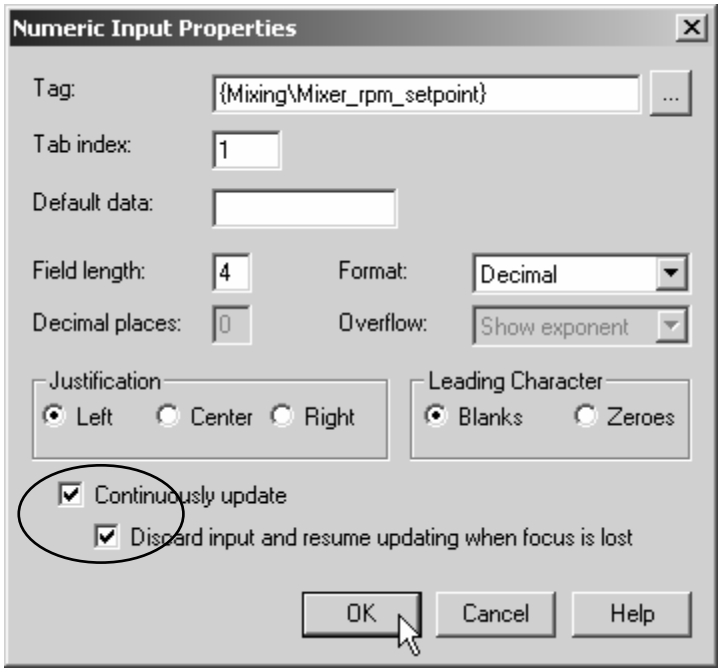
Clicking the **Tag** button will show the **Tab Browser**.

Some controls are assigned to specific tags; others may be assigned to Expressions.

Numeric and String Objects

- Numeric / String Displays - These objects display information from the Tag Database. Use the numeric display object to show the operator numeric information from the data source. For example, you might use a numeric display to show the current temperature of an oven in a bakery. Use the string display object to show the operator messages from the data source. For example, you might set up strings that report on the state of a process or operation, or that provide instructions about what the operator should do next.

- Numeric / String Input Enable – These objects allows operator input to the tag specified.



Continuously update - Check this to have tag value changes appear in the numeric input box in the display when the operator is not using it to enter values. If this check box is cleared, any value typed in the numeric or string input field object by the user, will remain displayed and waiting to be written to the programmable controller, until the user performs a download or presses ESC, which discards any user input. If the user performs an upload, a value from the programmable controller or OPC server is displayed in the input field.

Discard input and resume updating when focus is lost - When this option is checked, the input field discards any user input and returns to updating the field when it loses focus. This option is available when the Continuously update option is checked.

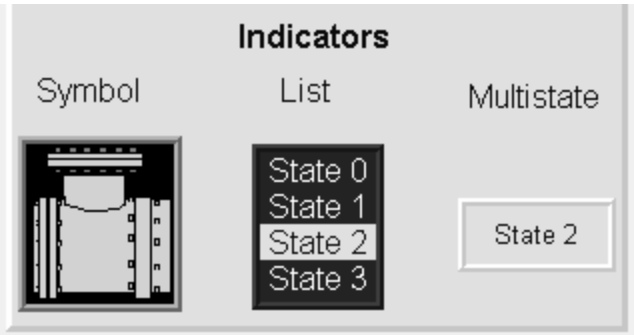
Indicator Objects

RSView Supervisory Edition has three different indicators available:

- Multistate - The multistate indicator displays the current state of a process or operation by showing a different color, caption, or image to reflect different states.

- Symbol - Symbol indicators show the state of a process or operation at a glance. For example, you might create a symbol indicator with a picture of a pump and set up the states so that the pump changes colors to show the state. You can assign unique attributes (such as color, blink, and so on) to every state, but the monochrome graphic image you assign to the indicator is used for all states.

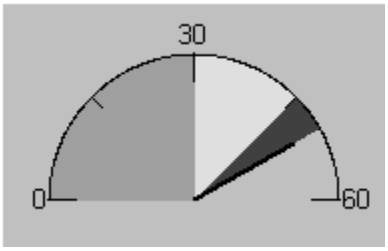
- List - The list indicator displays a list of states for a process or operation, and highlights the current state. Each state is represented by a caption in the list. This type of indicator is useful if you want to view the current state but also want to see the other possible states. For sequential processes, the list can alert the operator about what happens next in the process.



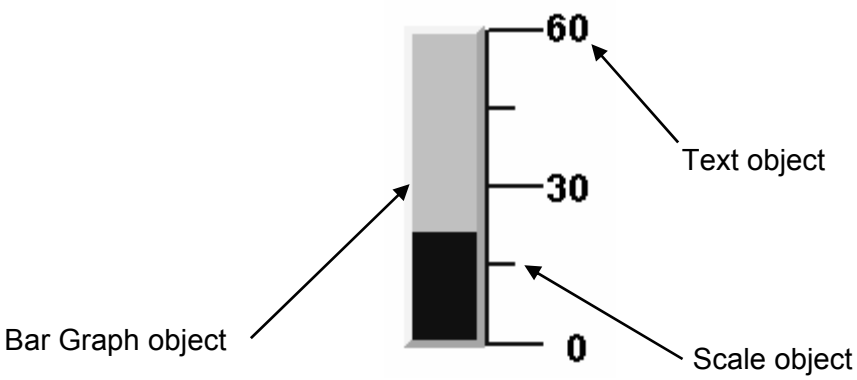
Gauge and Graph Objects

RSView Studio contains objects to represent data in both gauge and bar graph format.

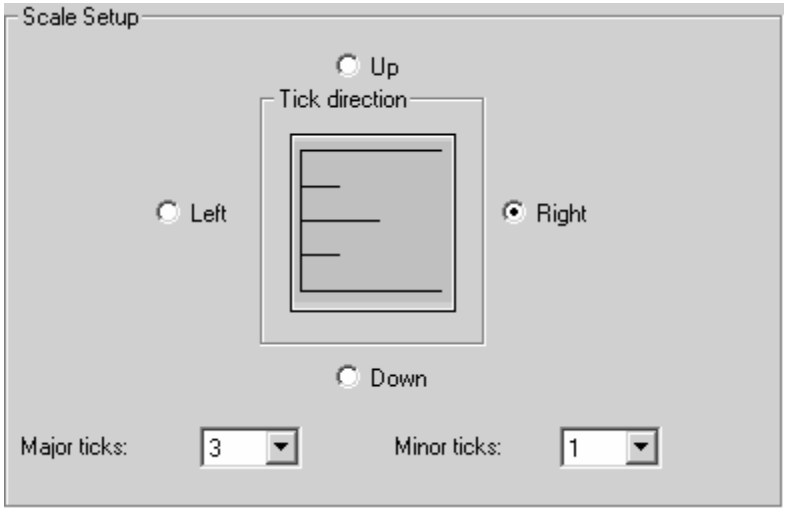
- Gauge – the gauge control will display tag or expression values with a sweeping line. Options include the ability to set two thresholds with unique fill colors.



- Bar Graph and Scale – These objects are used to display data in a bar chart format. Two thresholds with unique fill colors may be configured. Typically a scale object is used in conjunction with a bar graph to show tick marks.



Scale Setup:

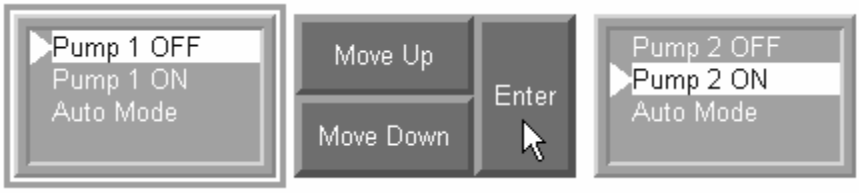


Key Objects

At runtime the operator can use key buttons to move the cursor and make selections on certain objects. You may have custom captions or images on the buttons. You can use key buttons with these graphic objects:

- Control List Selectors
- Display List Selectors
- Trends

Key buttons operate with the control that is highlighted. In this way, one set of key buttons can control multiple Control List Selectors, for example:

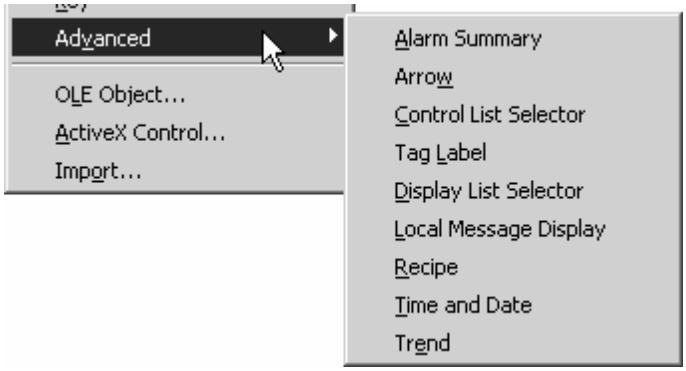


These are the types of key buttons:

- **Backspace** moves back to the previously highlighted item
- **End** moves to the bottom of the page that's currently displayed.
- **Enter** selects the currently highlighted item
- **Home** moves to the top of the page that's currently displayed.
- **Move Left** moves to the left.
- **Move Right** moves to the right.
- **Move Down** moves down one item in the list.
- **Move Up** moves up one item in the list.
- **Page Down** moves down one page in the list.
- **Page Up** moves up one page in the list.

Advanced Objects

A number of interactive objects are collected in the **Advanced** menu.



Alarm Summary and **Trend** objects will be covered in later chapters.

Arrow

An arrow object can move vertically or horizontally based on the results of an expression. The rectangle you draw when you create an arrow defines the arrow's path. The orientation of the rectangle (vertical or horizontal) should be the same as the direction the arrow is to move in.

The arrow's position within the rectangle is determined by the expression and is proportional to the expression's minimum and maximum values. For example, if a tank with a thousand gallon capacity is being monitored, the expression's minimum and maximum values would be 0 and 1000. If the tank is 50% full, the arrow will be halfway between the bottom and top of the rectangle.

Control List Selector

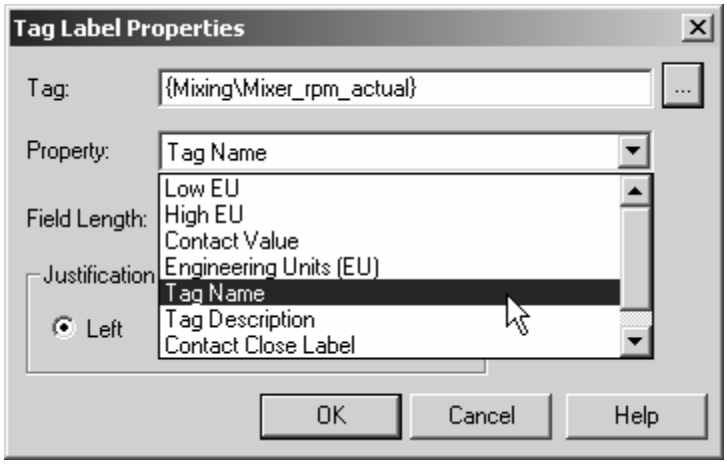
The control list selector allows the operator to select from a list of states for a process or operation. The list is highlighted to show the current state, and the operator can scroll through the list to select a different state. The value assigned to the selected state is written to the data source.

The tag entered in the Value control of the Connections tab is a read-write control. The application monitors this tag to control the operation mode. If the operator scrolls the list and selects an entry, the Value control value changes, and the machine switches modes.

Tag Label

Use label objects to display information about a tag's properties at run time. You can display the value of one property per tag label object.

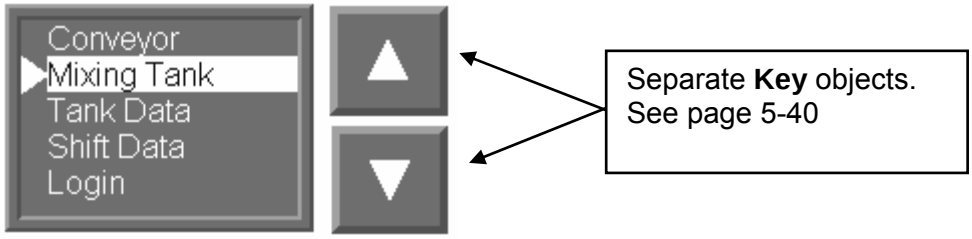
Select a property from the drop-down list. The properties listed are by their OPC property names. The value for all properties except Contact Value, are only read once when the display is opened and are not updated after that.



Display List Selector

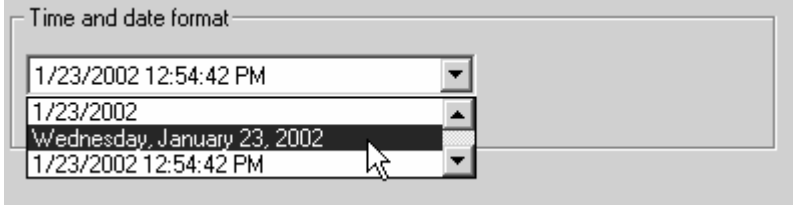
Use the display list selector to show a list of graphic displays that the operator can choose from. The operator can scroll through the list and select a graphic display.

The operator can scroll through the list and select displays using key buttons or by using the arrow keys and Enter key on a keypad or an external keyboard.



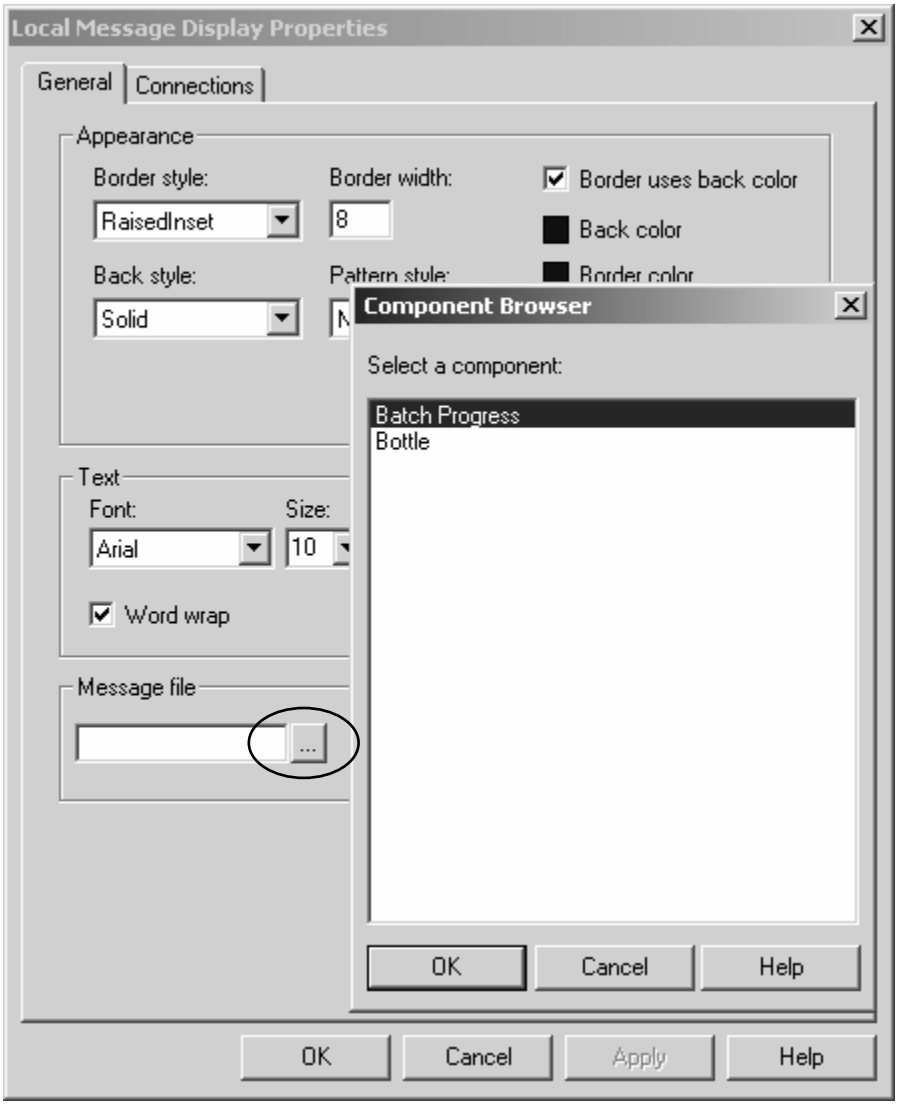
Time and Date

This object displays the Windows operating system time and date on the runtime computer. Double click to format the display.



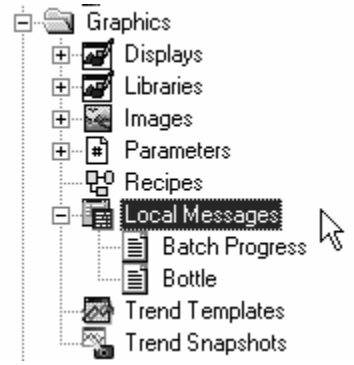
Local Message Display Object

A local message display object (**Objects, Advanced** menu) will show a line of text from a message file as it corresponds to a trigger value. The **Value** control in the **Connections** tab is the trigger. Select a previously defined local message file in the **General** tab.

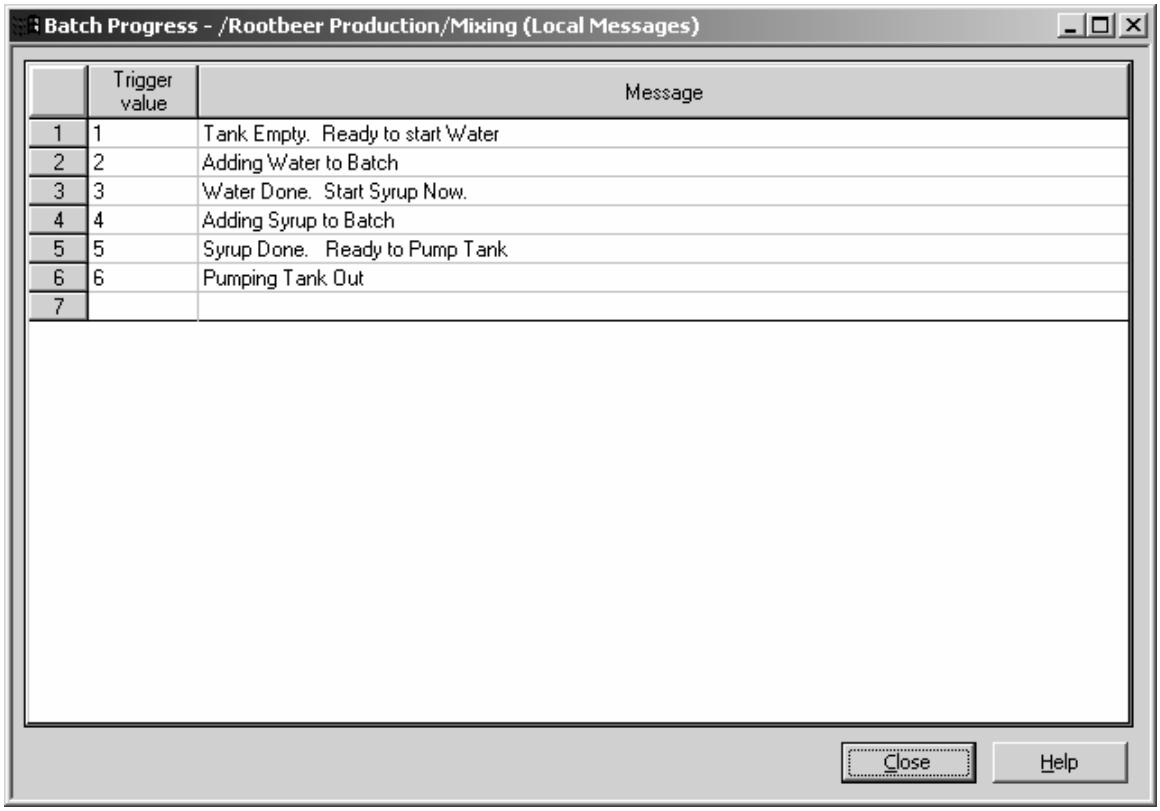


Local Message Files

Local Message Files are created and stored in the Graphics folder in your Project Explorer:



Here is an example of a Local Message File:


Batch Progress - /Rootbeer Production/Mixing (Local Messages)
Trigger value
Message
1 1 Tank Empty. Ready to start Water
2 2 Adding Water to Batch
3 3 Water Done. Start Syrup Now.
4 4 Adding Syrup to Batch
5 5 Syrup Done. Ready to Pump Tank
6 6 Pumping Tank Out
7
Close
Help

Trigger values are arbitrary, but must be unique. They can be positive or negative, but not zero.

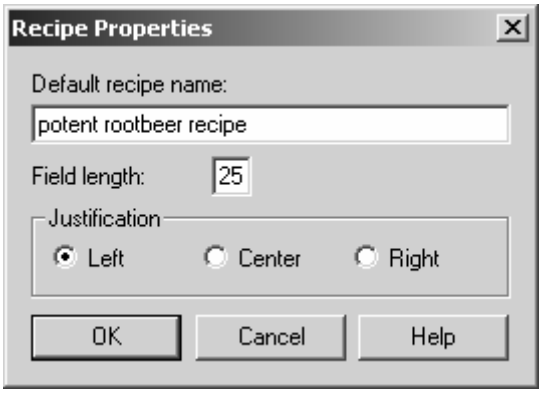
The message can be up to 256 characters long. You can use the new line character, **\n**, to specify that the message continues onto the next line after the character. Embedded Variables may be inserted into a message. Right-click the message and select Edit.

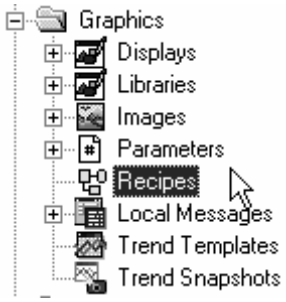
Recipe

A **recipe object** provides operators a way to specify the name of a **recipe file** containing data for the numeric and string input boxes in a display.

You can create a recipe using the Recipes editor or any text editor that produces ASCII files. You can also create a recipe by saving the values from input boxes in a graphic display to the name specified in the Recipe input object.

The user can read data from a recipe on disk to the input boxes, then download these values to an external device such as a programmable controller. Alternately, the operator can upload values from an external device into the input boxes, and then save the contents of the boxes to the recipe.



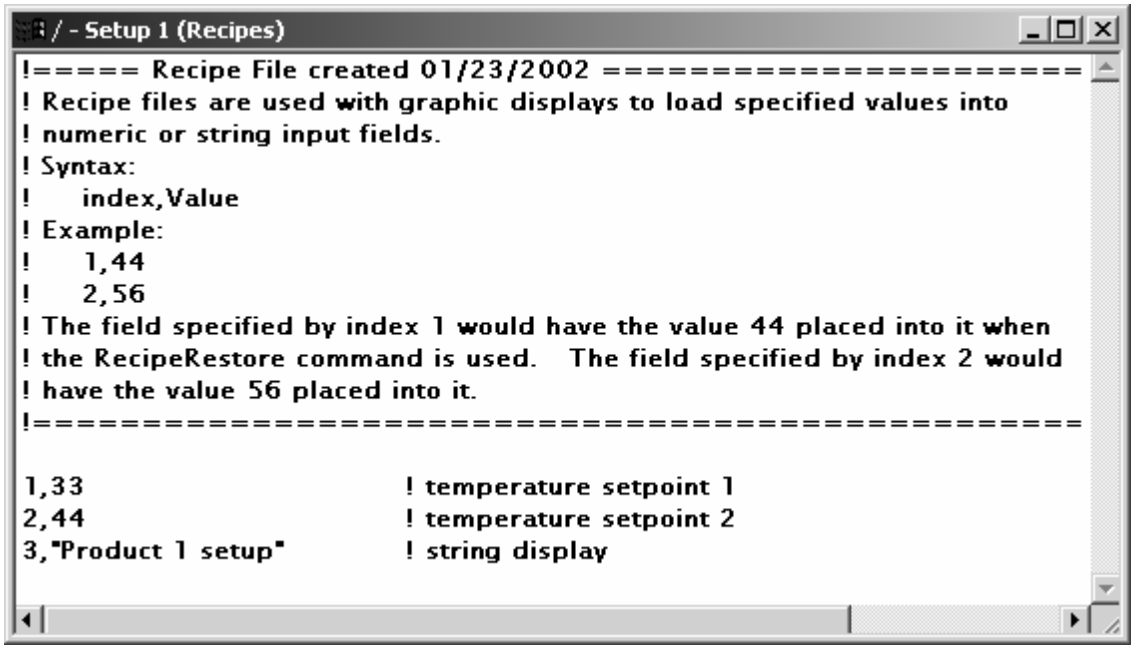


Recipe Files

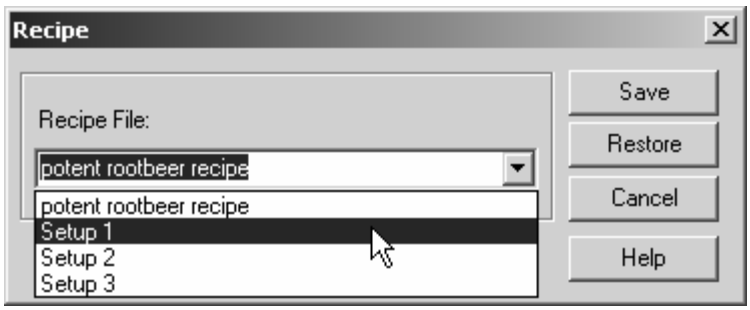
Create recipe files in the Recipes Editor under the Graphics folder.

When you create numeric and string input boxes, each is assigned an **index number**.

Use this index number when creating a recipe. For each line in the recipe, specify the index number, a comma, and the value. String values must be in quotes. You can include comments in the file by placing an exclamation mark after the value, and entering the comment. For example a simple recipe would look like the following:


/ - Setup 1 (Recipes)
!===== Recipe File created 01/23/2002 ======================
! Recipe files are used with graphic displays to load specified values into
! numeric or string input fields.
! Syntax:
! index,Value
! Example:
! 1,44
! 2,56
! The field specified by index 1 would have the value 44 placed into it when
! the RecipeRestore command is used. The field specified by index 2 would
! have the value 56 placed into it.
!==
1,33 ! temperature setpoint 1
2,44 ! temperature setpoint 2
3,"Product 1 setup" ! string display

At runtime, the operator double-clicks the recipe object to show the Recipe dialog box:



Recipes may be restored to the input objects or controller values may be saved to recipe files from here.

Lab 5 – Building an Interactive Graphic Display

Objective: Create a graphic display using interactive objects to read and write data.

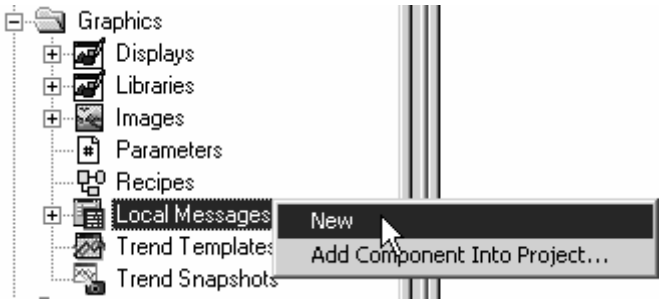
Software Requirements:

- RSView Studio
- SoftLogix 5860 running RSView_Class_SoftLogix program

Objective: In this lab, you will build a screen representing a batching tank. You will use objects to manipulate and show data from a PLC program. You will use objects from the graphical library.

1. Create a Local Message File

- This local message file will contain messages that track the progress of a bottle being filled and capped. Right-click on the Local Messages icon and select **New**. Configure the Trigger values and Messages as shown:



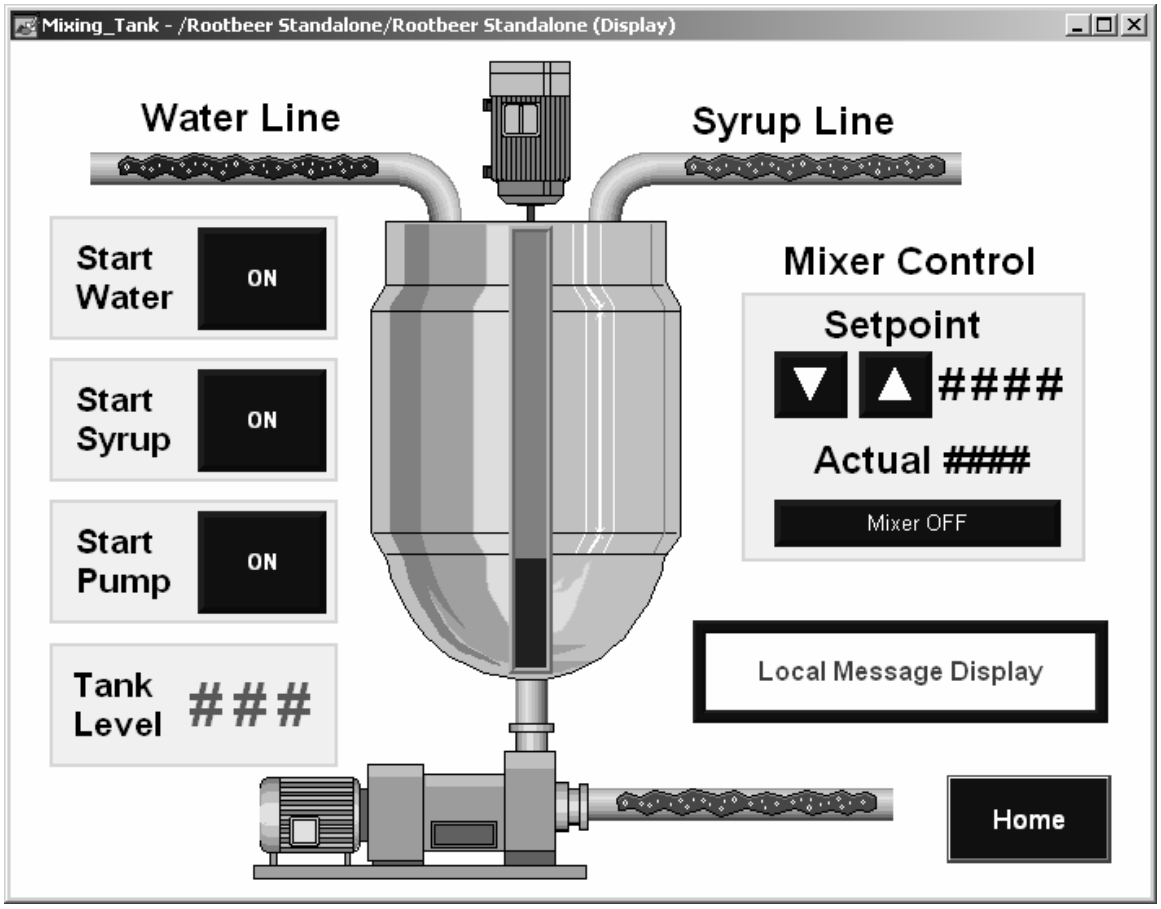
Batch Progress - /Rootbeer Production/Mixing (Local Messages)

	Trigger value	Message
1	1	Tank Empty. Ready to start Water
2	2	Adding Water to Batch
3	3	Water Done. Start Syrup Now.
4	4	Adding Syrup to Batch
5	5	Syrup Done. Ready to Pump Tank
6	6	Pumping Tank Out
7		

- Save the Local Message file as **Batch Progress**.

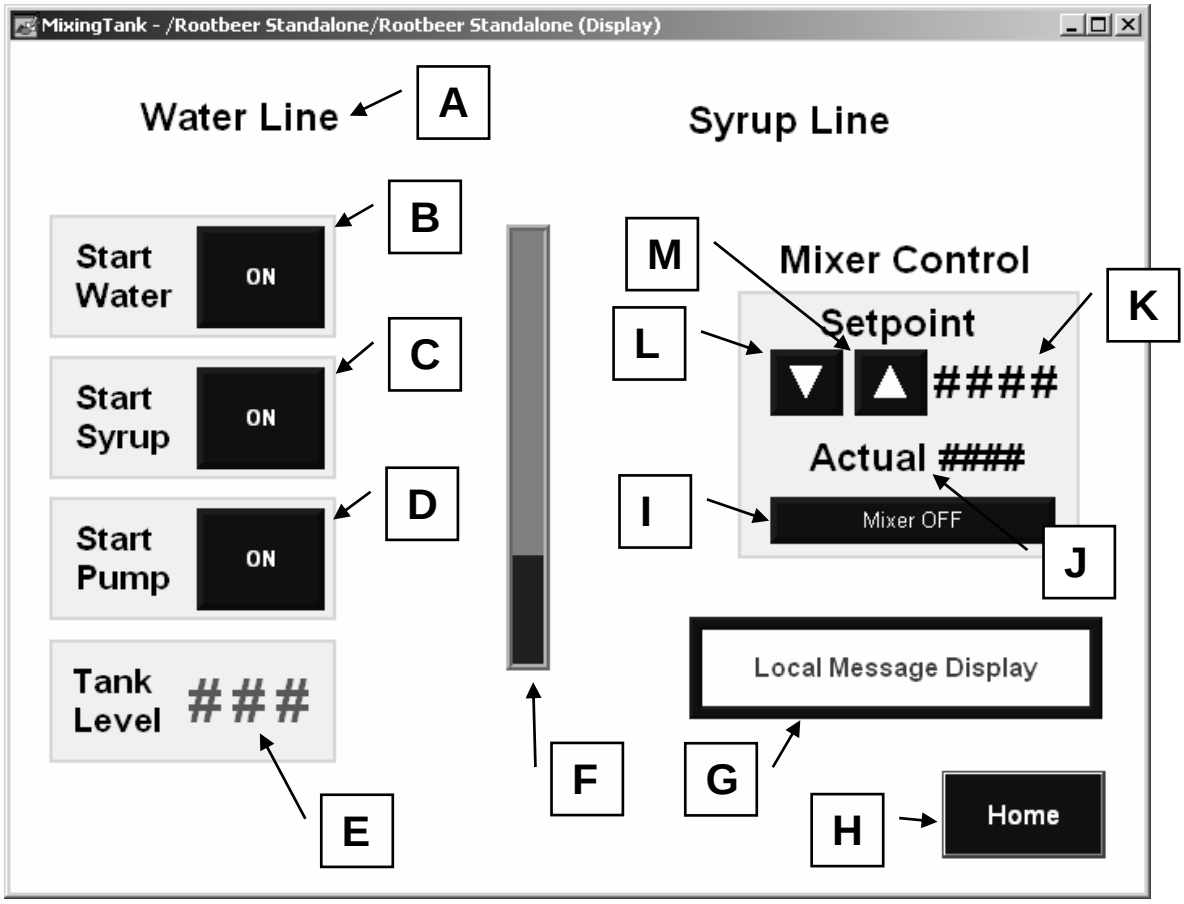
2. Create a new graphic display

- Create a new graphic display. Refer to the following pages for instructions on how to build it. At the end of the lab, it will have the following objects:



- As soon as you place an object on the display, save it as **MixingTank**. Remember to save your work often!

3. Add Objects (see following pages for details)



A. Text – All text can be the same:
- Fore color = black, Back style = Transparent
- Font = Arial, 18 pt, bold

B. This group consists of **Text,** a **Panel,** and a **Momentary Push Button**.
- Configure the Push Button:
- States Tab – State0
  - Caption = "OFF", Caption back style = Transparent
  - Arial, 12 pt, Bold.
- States Tab – State1
  - Caption = "ON", Caption back style = Transparent
  - Arial, 12 pt, bold.
- Connections Tab – browse for Data Server tags
- Value = `{::[RSView_Class_SoftLogix]Program:Mixing.H2O_on_off}`
- Indicator = `{::[RSView_Class_SoftLogix]Program:Mixing.H2O_hold}`

C. Duplicate the group in step **B**. Change the pushbutton tags in the new group:
- Value = `{::[RSView_Class_SoftLogix]Program:Mixing.Syrup_on_off}`
- Indicator = `{::[RSView_Class_SoftLogix]Program:Mixing.Syrup_hold}`

D. Duplicate the group in step **B** again. Change the pushbutton tags in the new group:
- Value = `{::[RSView_Class_SoftLogix]Program:Mixing.Pump_on_off}`
- Indicator = `{::[RSView_Class_SoftLogix]Program:Mixing.Pump_hold}`

E. **Numeric Display** – This displays the current tank level from the processor
- Expression – Build the following using the **Tag** and **Arithmetic** buttons:

`{::[RSView_Class_SoftLogix]Program:Mixing.Mixer_Tank_Level} / 10`

- Right-click and select **Property Panel**. Change the Font and Fore Color to your liking.

F. **Bar Graph** – Select the Bar Graph tool and draw out a rectangle.
- General Tab
  - Back Color = gray, Fill Color = Blue
  - Min Value = 0, Max Value = 1000
  - Threshold 1 value = 500, Fill Color = Brown
- Connections Tab Value = `{::[RSView_Class_SoftLogix]Program:Mixing.Mixer_Tank_Level}`

G. **Local Message Display** – this will display process information.
- General Tab –
  - Border style = RaisedInset, Back style = Transparent, Fore color = red
  - Arial, 12 pt, Bold.
  - Message file = “Batch Progress”
- Connections Tab – Value = `{::[RSView_Class_SoftLogix]Program:Mixing.Mixing_Message}`

H. **Button** – this will display the Main graphic display (to be created later)
- Action tab – Run **`Display Main`** command on release
- Up Appearance – Caption = **Home**. Select any color.

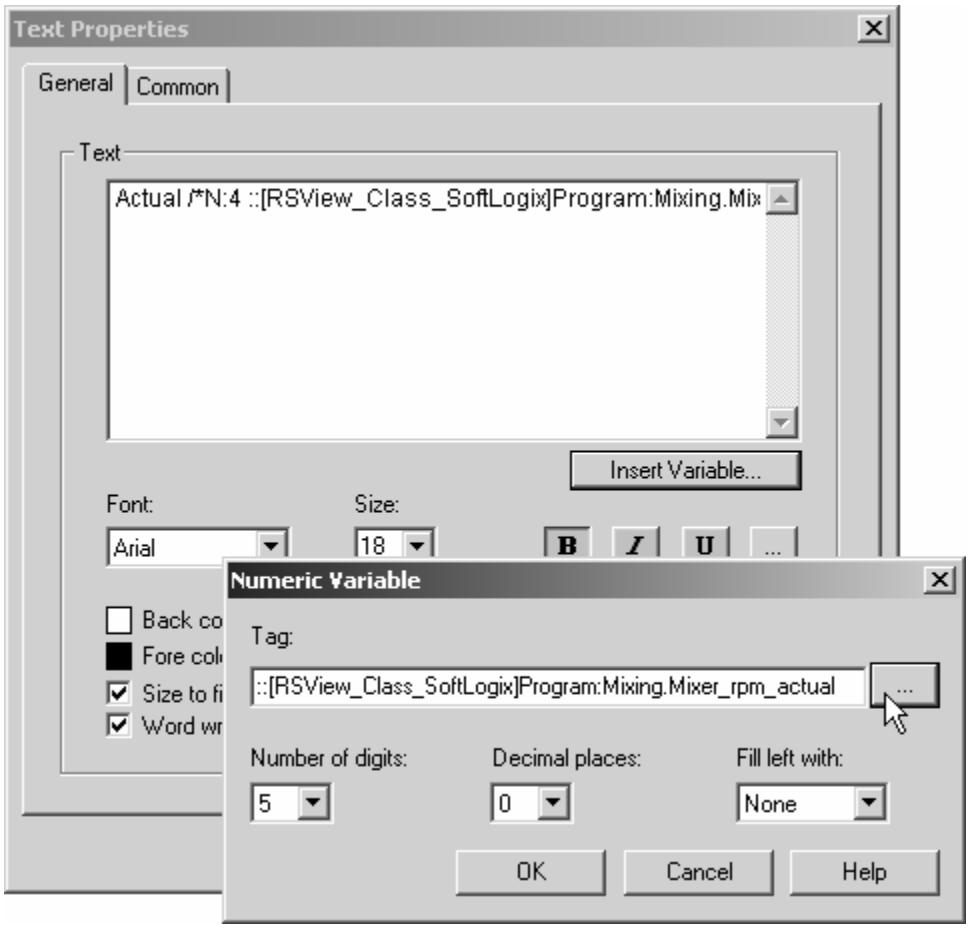
I. **Maintained Push Button** – this will start and stop the mixer
- States Tab – State0
  - Caption = “Mixer OFF”, Caption back style = Transparent
  - Arial, 12 pt, Bold.
- States Tab – State1
  - Caption = “Mixer ON”, Caption back style = Transparent
  - Arial, 12 pt, bold.
- Connections Tab – browse for Data Server tags
- Value = `{::[RSView_Class_SoftLogix]Program:Mixing.Mixer_on_off}`

J. **Text Object** – This embeds the actual mixer rpm from the processor

- General - Enter the text **Actual**. Insert a Numeric Variable referencing the Mixer rpm tag

```
{::[RSView_Class_SoftLogix]Program:Mixing.Mixer_rpm_actual}
```

- Arial, 18 pt, Bold



K. Numeric Display – This displays the mixer RPM setpoint from the processor

- Expression – Browse for the **Tag**

```
{::[RSView_Class_SoftLogix]Program:Mixing.Mixer_rpm_setpoint}
```

- Right-click and select **Property Panel**. Change the Font and Fore Color to your liking.

L. Ramp Button – This will decrement the mixer RPM

- General Tab –
  - Button Settings = Ramp Down
  - Lower Limit = 0
  - Ramp Value = 10
- Label Tab - Image = Arrow Down
- Timing Tab – Auto Repeat rate = 10
- Connections Tab - Value =

```
{::[RSView_Class_SoftLogix]Program:Mixing.Mixer_rpm_setpoint}
```

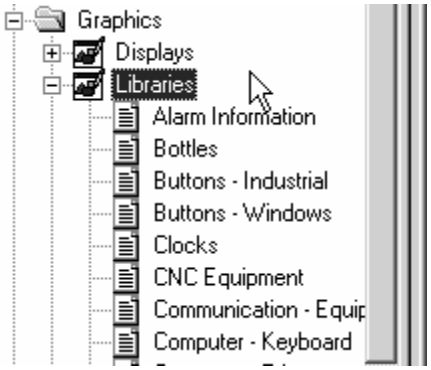
M. Ramp Button – This will increment the mixer RPM

- General Tab –
  - Button Settings = Ramp Up
  - Upper Limit = 1740
  - Ramp Value = 10
- Label Tab - Image = Arrow Up
- Timing Tab – Auto Repeat rate = 10
- Connections Tab - Value =

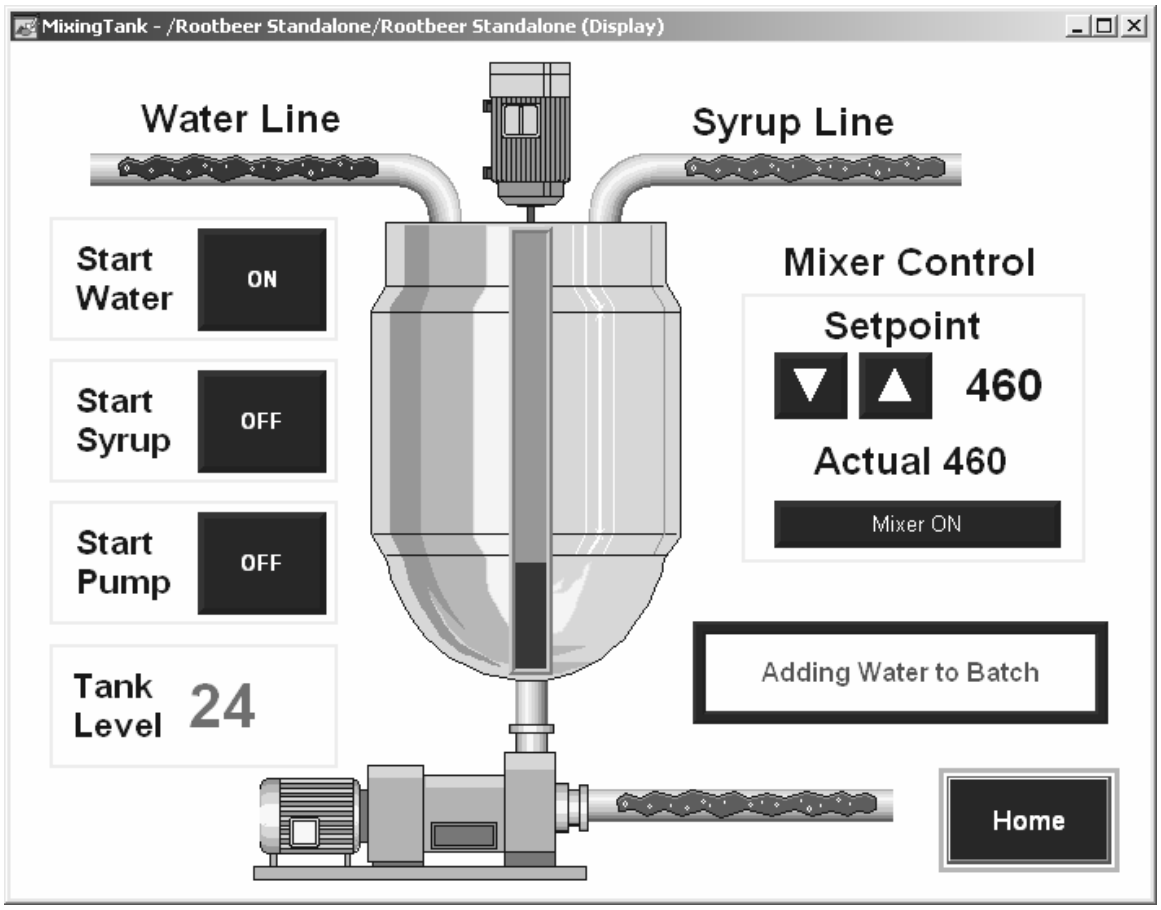
```
{::[RSView_Class_SoftLogix]Program:Mixing.Mixer_rpm_setpoint}
```

4. Copy objects from the Graphic Libraries

- Open the **Libraries** icon in the Graphics folder.



- Add to your display using objects from the **Tanks**, **Motors**, **Pumps**, and **Pipes 3** libraries. Stretch and alter the objects to come up with a display that looks like the picture below.



- Test run the display to verify the operation. Save and close the graphic when you are done troubleshooting.

This Lab is Finished

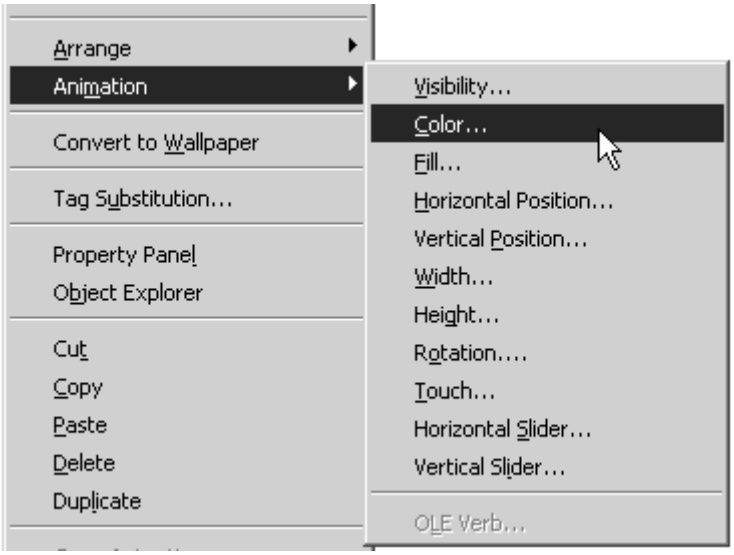
Animating Graphical Objects

RSView Machine Edition has the capability of animating graphic displays. Objects within the display may change appearance, size or location based on a changing tag value or the result of a logical expression. The following animation types are available on **Drawing** objects:

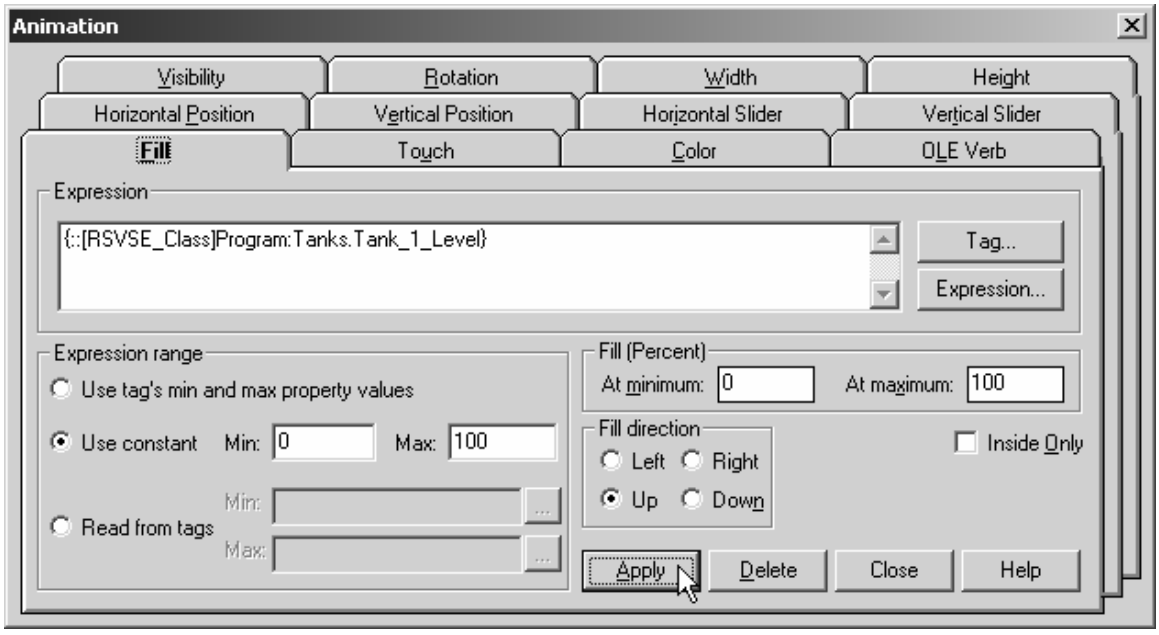
- Visibility
- Rotation
- Width
- Height
- Fill
- Color
- Touch
- Horizontal Position
- Vertical Position
- Horizontal Slider
- Vertical Slider

Panel objects and some interactive objects (such as push buttons and Trends) support visibility animation only.

To animate an object, select it and choose **Animation** from the right-click menu, or click the **Animation** menu.



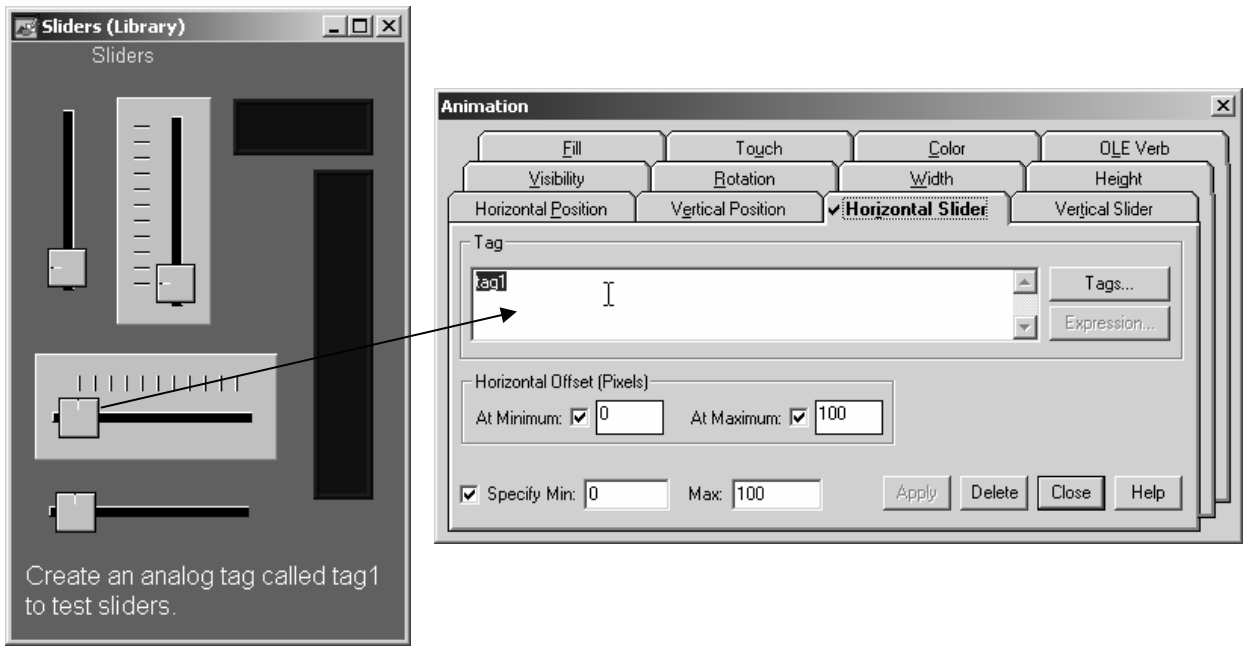
Selecting any of the animation options brings up the **Animation** dialog box. Fill in the **Expression** box. RSView Supervisory Edition will evaluate the expression and animate accordingly. If the expression is simply a tag, select the **Tags…** button to show the Tag Browser. Click the **Expression…** button to create a logical expression to be evaluated.



Expression Range:

Only HMI tags support min / max properties. If you use a Data Server tag, define the Expression Range by selecting **Use constant**, or **Read from tags**.

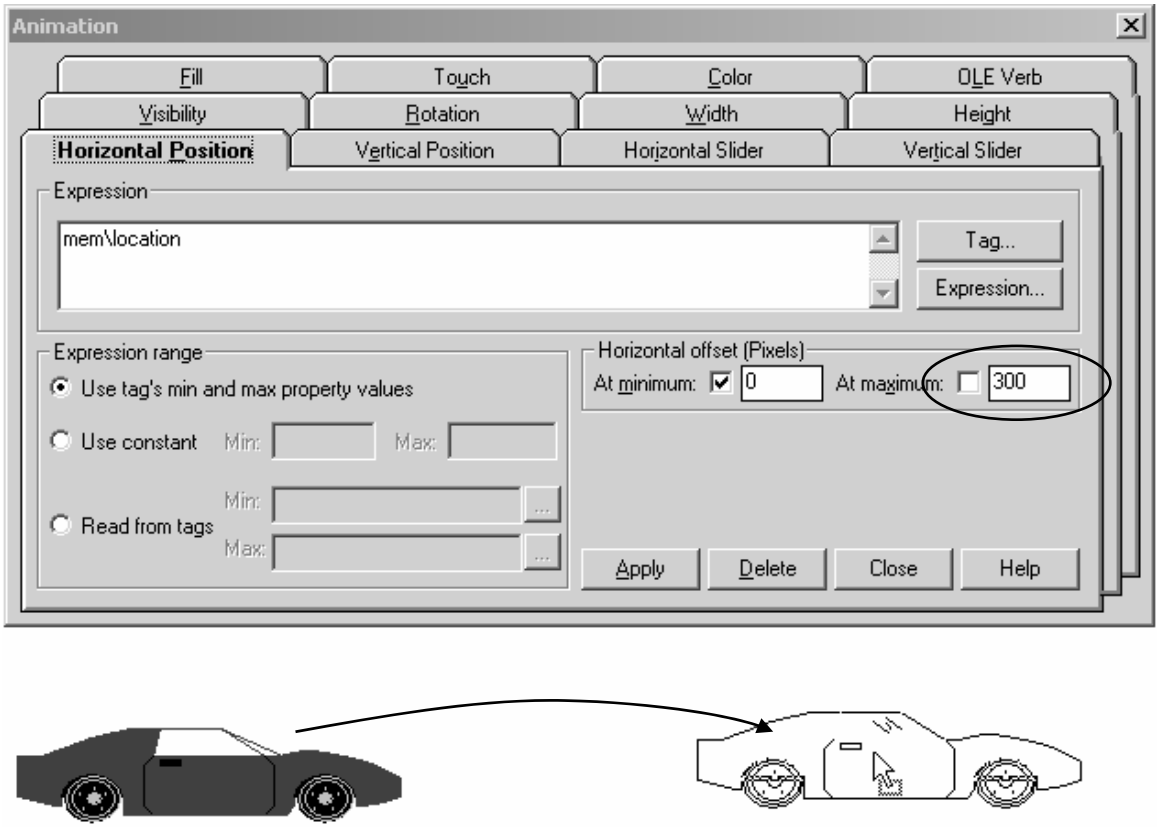
Many **Graphic Libraries** contain pre-built animated objects. Sliders, for example, contain grouped objects with vertical or horizontal slider animation. To use in your project, drag and drop it into your display, then replace the animated part of the group with your tag.



Animation - Object Smart Path

Range of motion type animation (position, rotation, width, height) can be dictated using Object Smart Path. This takes the guesswork out of animation, and allows you to visually set the range of motion.

For example, you want the car object to move from the left of the graphic to the right according to the min/max values of at tag called outputs\location. Select **Horizontal Offset Animation**. Use OSP to set the pixel offset. If the car is in the desired start position (min), check the box for a zero offset. Select the car object and move it to the desired end location. The number in the max offset field changes automatically as you move the object. Click the checkbox when it is where you want it to fix the position. Apply the animation changes.



Test Display

Use Test Display Mode to see the effects of any changes to your graphic (animation, numeric displays etc…). Click the **Test Display** button in the **Graphics** toolbox or select it from the **View** menu to activate the graphic display.

Lab 6 – Animating a Graphic Display

Objective: Animate a graphic display using interactive objects to read and write data.

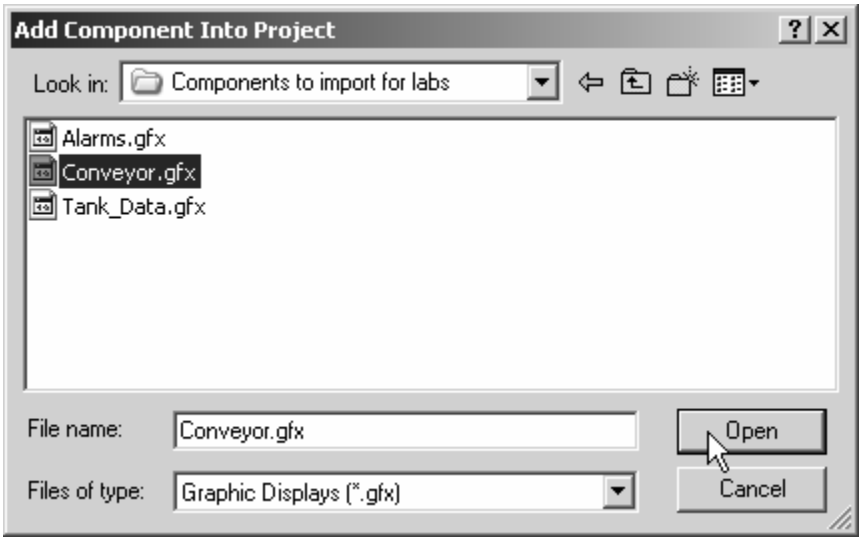
Software Requirements:

- RSView Studio
- SoftLogix 5860 running RSView_Class_SoftLogix program

1. Import Components

- You will animate a pre-built graphic display. Right-click on Displays and choose to Add Component Into Application

- Add the **Conveyor** display from the **Components to import for labs** directory.



- Right-click on the **Local Messages** icon and choose to Add Component into Application. Add the **Bottles.loc** file from the Class Files / Components to import directory.

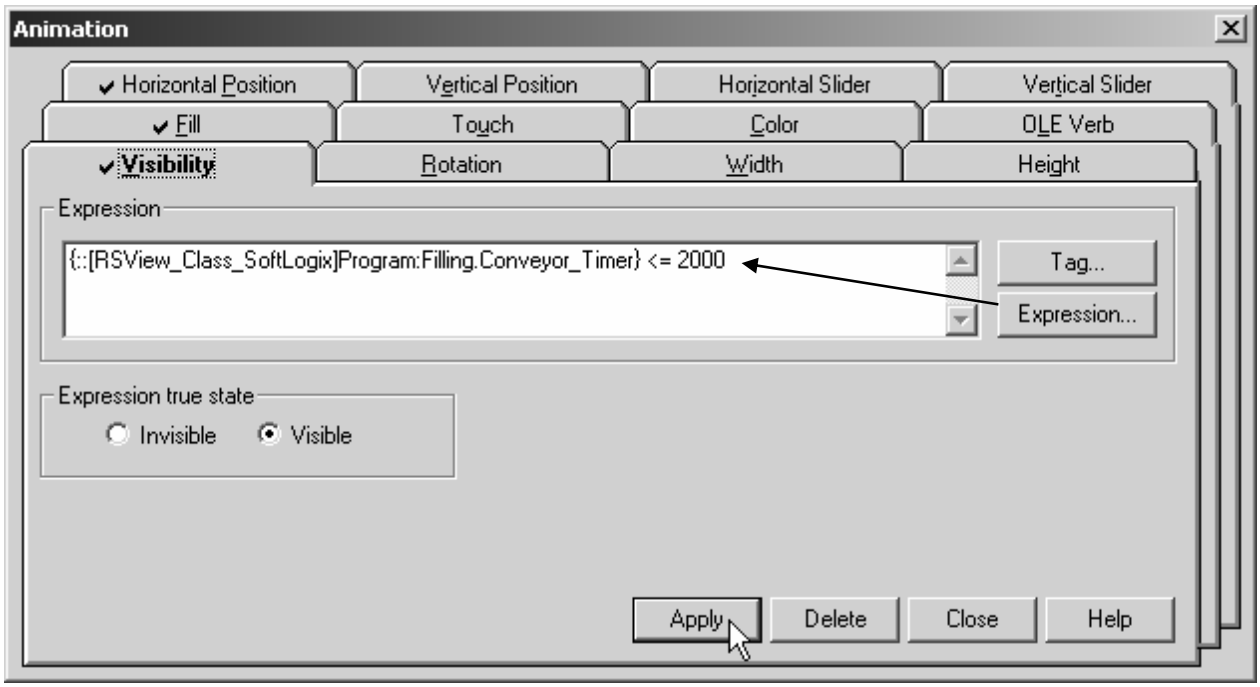
2. Open the Conveyor Graphic Display

- Each bottle will have three animations attached to it: **Visibility**, **Fill**, and **Horizontal Position**. The animation is assigned to the RSView tag:

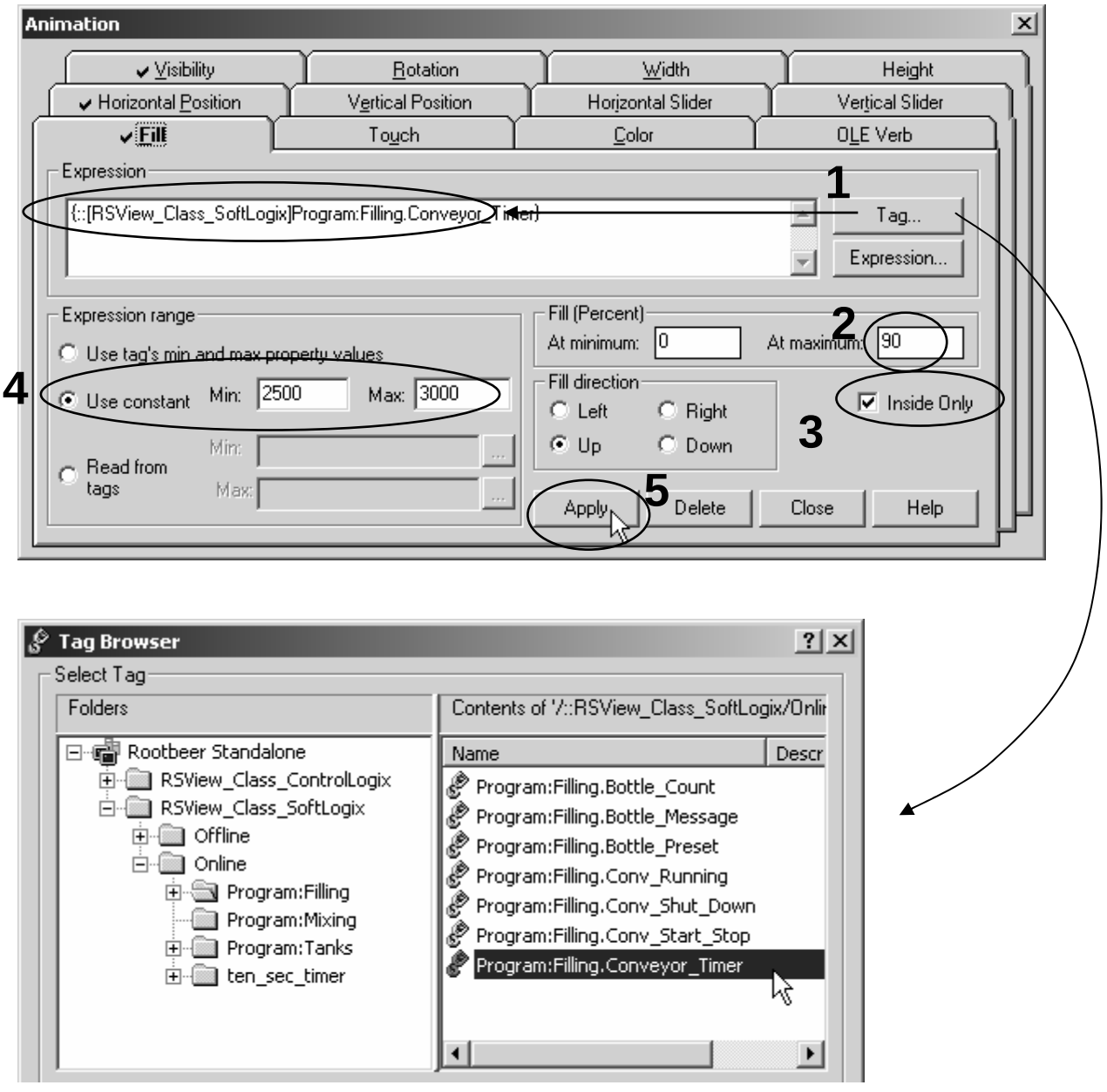
  `{::[RSVIEW_CLASS_SOFTLOGIX]PROGRAM:FILLING.CONVEYOR_TIMER}`

  This is a timer accumulator in the SoftLogix. The timer lasts for 8 seconds and has a time base of 0.001 seconds.

- Select Bottle 1 (the left bottle). Choose **Visibility** from the **Animation** menu. The first bottle should be visible when the timer is between 0 and 2000. Click the **Expression…** button and build the following expression:

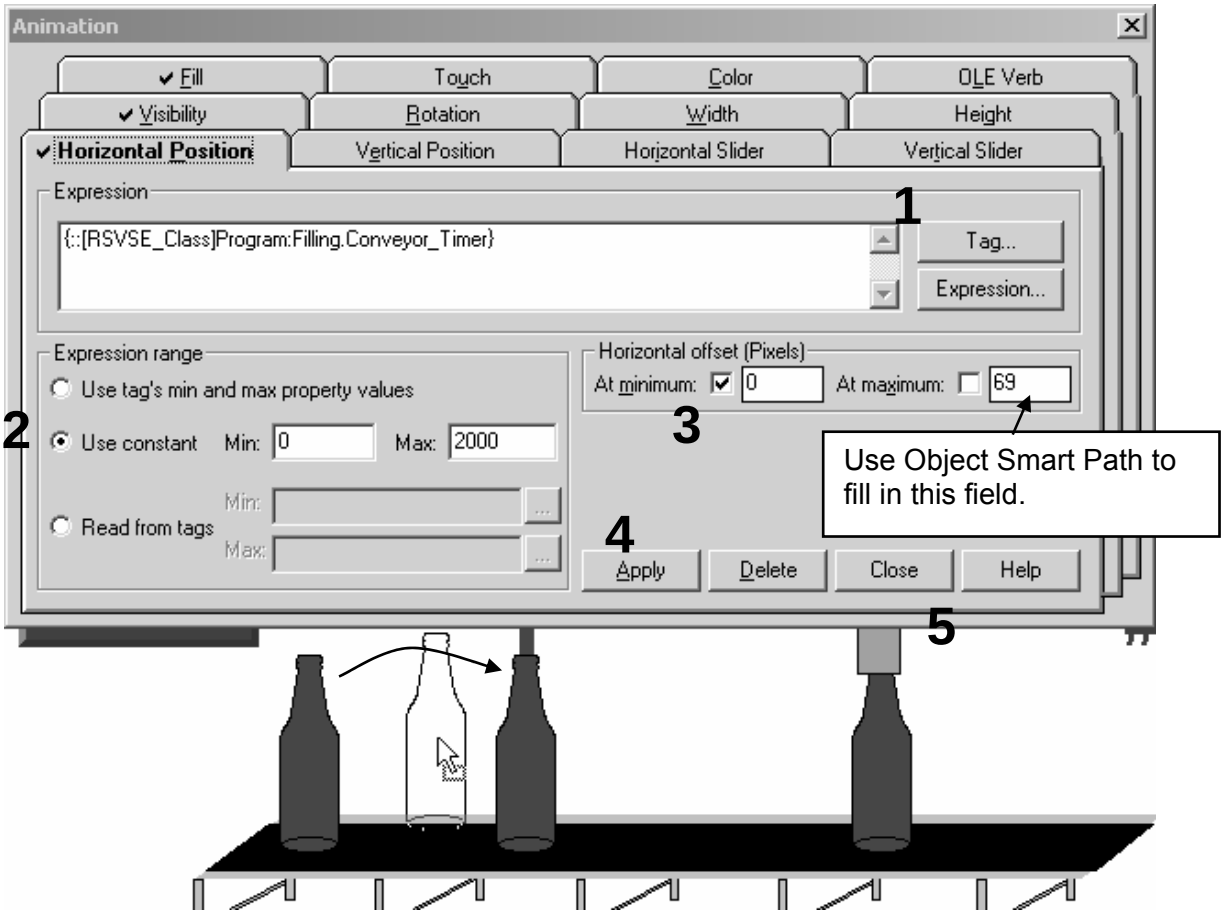


- With the **Animation** dialog box still open, click on the **Fill** tab. The contents of the bottle will fill when the timer is between 2500 and 3000.
    1. Click the **Tags** button and browse to the correct Data Server tag. Use your home area.
    2. Configure the bottle to fill only to 90%, from bottom to top.
    3. Fill from the inside only – this will keep the outline of the bottle.
    4. Specify the range of values of the timer for the Fill animation to occur. Select **Use Constant** and specify the min = **2500** and max = **3000**.
    5. Click the **Apply** button when you are done editing.



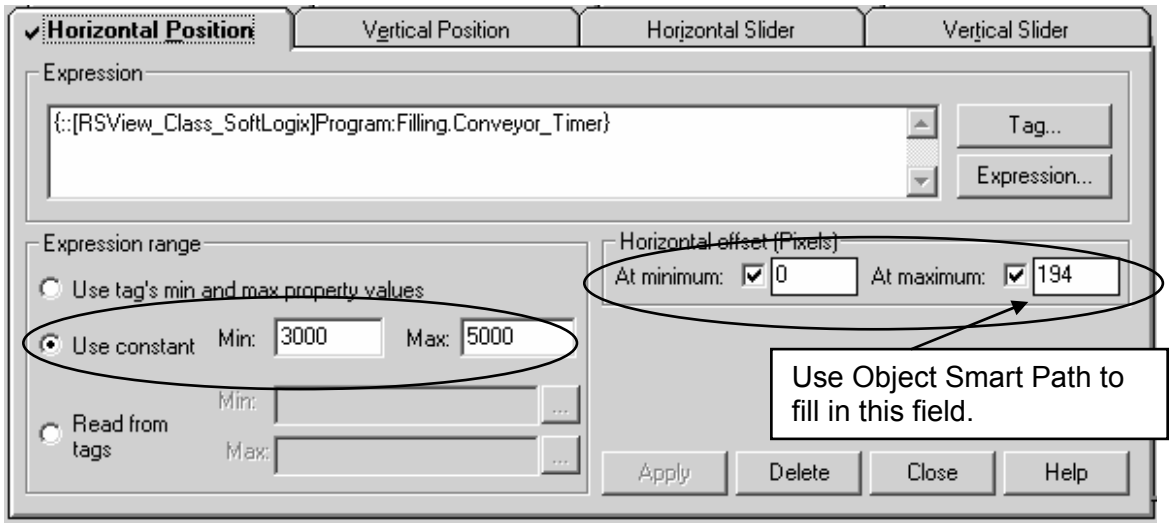
- With the **Animation** dialog box still open, click on the **Horizontal Position** tab. The bottle should move from the left side of the conveyor to underneath the filling machine when the timer is between 0 and 2000.

    1. Click the **Tags** button to browse for the tag.
    2. Specify the min and max of the timer (0 to 2000).
    3. Use "object smart path" to determine the pixel offset. With the bottle in the starting position, place a check next to At Minimum (zero pixel offset). Then drag the bottle underneath the filling machine (on top of the middle bottle). The numbers in the At Maximum field will change as you move the bottle. Place a check when you have dragged the bottle to its destination.
    4. Click **Apply** to save the changes.
    5. Close the Animation dialog box.

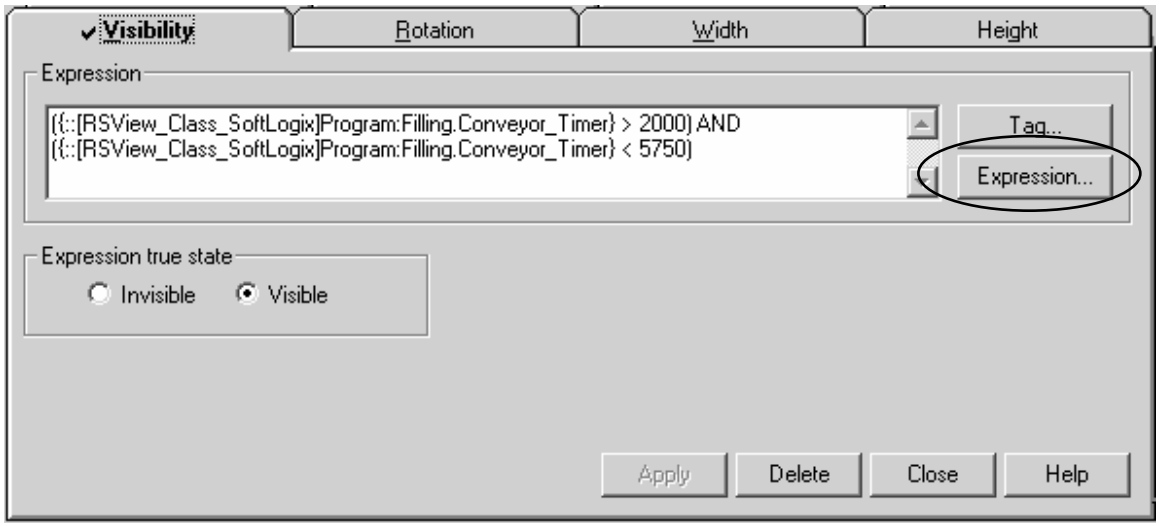


3. Copy, Paste and Edit Bottle 2 Animation

- Right-click **Bottle 1** (the left bottle) and select **Copy Animation**. Right-click **Bottle 2** (the middle bottle) and select **Paste Animation**. Alternately, you can use the **Edit** menu to do the copy and paste.
- The **Fill** animation does not change.
- Edit the **Horizontal Position** animation so the bottle moves when the timer is between 3000 and 5000. Use Object Smart Path to move the bottle from under the Filler to under the Capper.

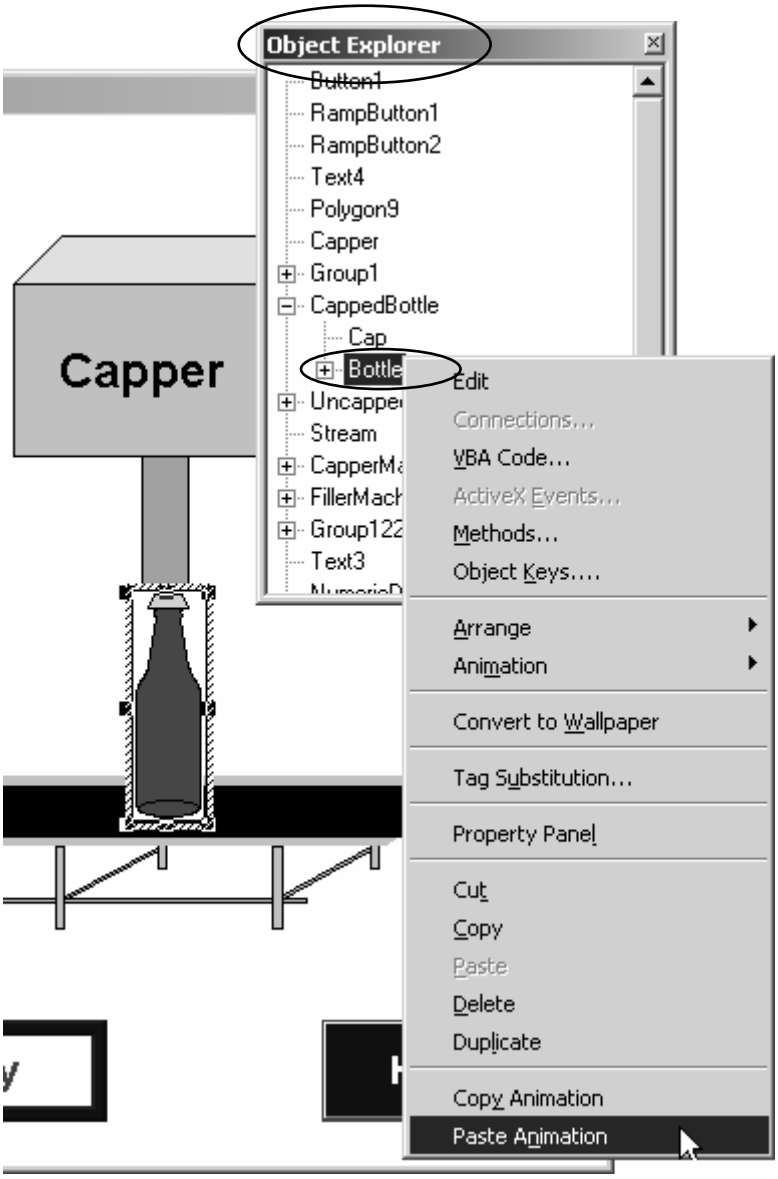


- Bottle 2 should be visible when the timer is between 2000 and 5750. Open the **Visibility** animation and build the following expression using the Tags, Logical and Relational buttons. You must manually add the open and closed parenthesis ( ) to the expression:

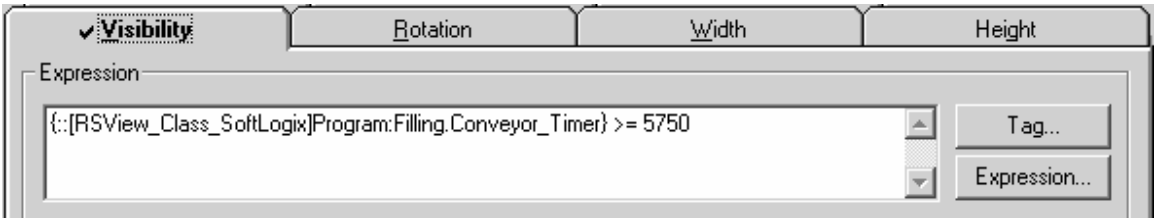


4. Copy, Paste and Edit Bottle 3 Animation

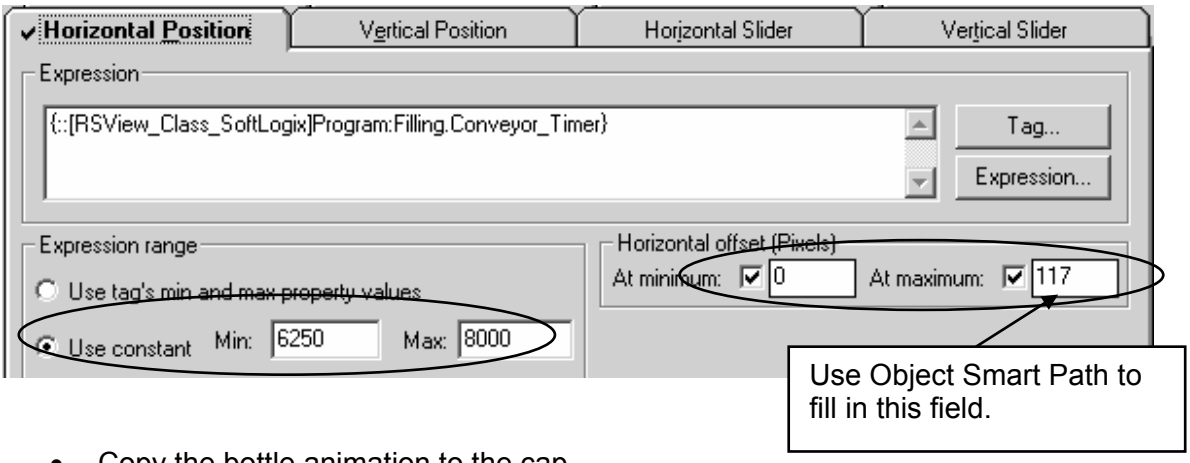
- Bottle 3 is a group made up of a cap and bottle. The animation must be applied to the cap and bottle separately. Both items get **Visibility** and **Horizontal Position** animation, but only the **bottle** gets **Fill** animation.
- Paste animation from Bottle 1:
  - Right-click **Bottle 1** in the graphic display and select **Copy Animation**.
  - Select **Object Explorer** from the **View** menu or the toolbar. The Object Explorer shows all graphical objects in an Explorer tree.
  - Select the object called **Capped Bottle**. Expand it to show the objects within the group.
  - Right-click the highlighted **Bottle** in the Object Explorer and select **Paste Animation**.



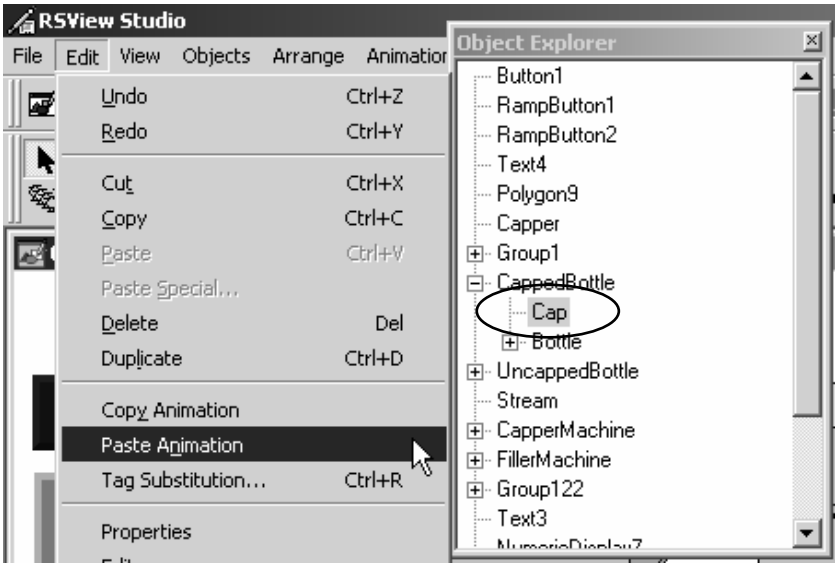
- Edit Bottle 3 Animation. The **Fill** animation does not change.
- With the bottle still highlighted in the Object Explorer, select **Visibility** from the **Animation** menu. The bottle should be visible when the timer is greater than or equal to 5750. Apply the change.



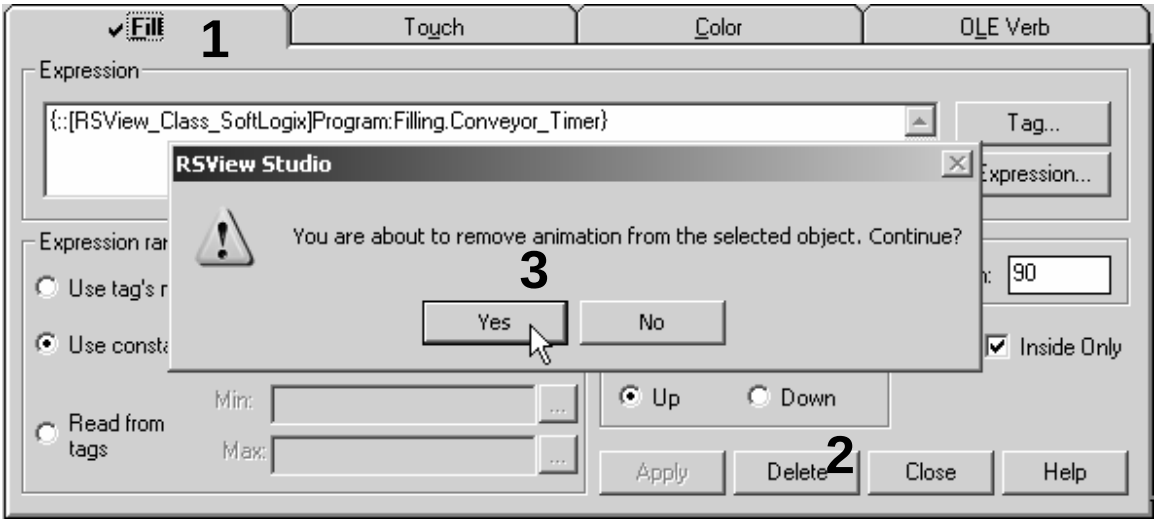
- Select the **Horizontal Position** tab. The bottle should move when the timer is between 6250 and 8000. Use Object Smart Path to position the bottle at the end of the conveyor.



- Copy the bottle animation to the cap.
  - Select **Bottle** from the Object Explorer (**View** menu).
  - Right-click and select **Copy Animation** (or select from the **Edit** menu).
  - Select **Cap** from the Object Explorer.
  - Right-click and select **Paste Animation** (or select from the **Edit** menu).



- Delete the Fill animation from the Cap. Show the **Fill** animation for the Cap. Click the **Delete** button. Click **Yes** to delete the animation.



- Summary of Bottle Animations:

Animation	Bottle 1 (left)	Bottle 2 (middle)	Bottle 3 (right)
Visibility	timer tag <= 2000	(timer tag > 2000) AND (timer tag < 5750)	timer tag >= 5750
Horizontal Position	timer tag min = 0 max = 2000	timer tag min = 3000 max = 5000	timer tag min = 6250 max = 8000
Fill	0 to 90% fill min = 2500, max = 3000	0 to 90% fill min = 2500, max = 3000	(bottle only) 0 to 90% fill min = 2500, max = 3000

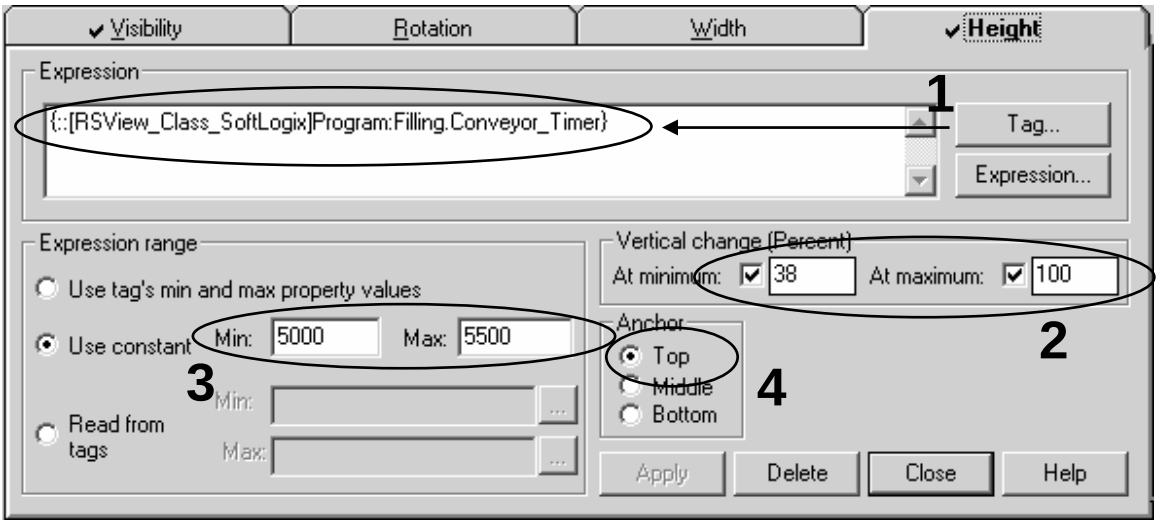
5. Test Run the Display

- Check your animation settings by test running the graphic display. Click the **Test Display** button on the toolbar. Use the **Ramp** buttons to enter a number of bottles to process. Click the **Start** button on the graphic display. You should see the empty bottle move along the conveyor, fill, be capped and counted. Check that the **Local Message Display** is updating correctly. Stop the test run when you are done troubleshooting.

6. Animate the Filling and Capping Machines

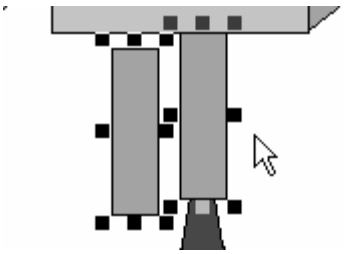
- Animate the **stream** coming from the **filling machine**. The rectangle should be visible when the timer tag is between 2250 and 3000. There is no fill animation, just **visibility**. (This is similar to the Bottle 2 Visibility animation.)
- The **capper machine** should have the effect of moving down and then up to reveal a capped bottle. To achieve this, make a **duplicate** of the gray rectangle. Apply **Visibility** animation to one rectangle so it is visible when the timer tag is less than 5750. The other rectangle should be visible when the timer is over 5750.

- Click on the **Height** tab after setting the Visibility animation. The first rectangle (visible under 5750) should start small (38%) and expand down to 100%.
    1. Choose the tag from the **Tags** button.
    2. Specify the percent change from a minimum of **38%** to a max of **100%**
    3. Specify the height change to take place from **5000** to **5500** of the tag value
    4. Anchor the height animation about the **top** of the rectangle



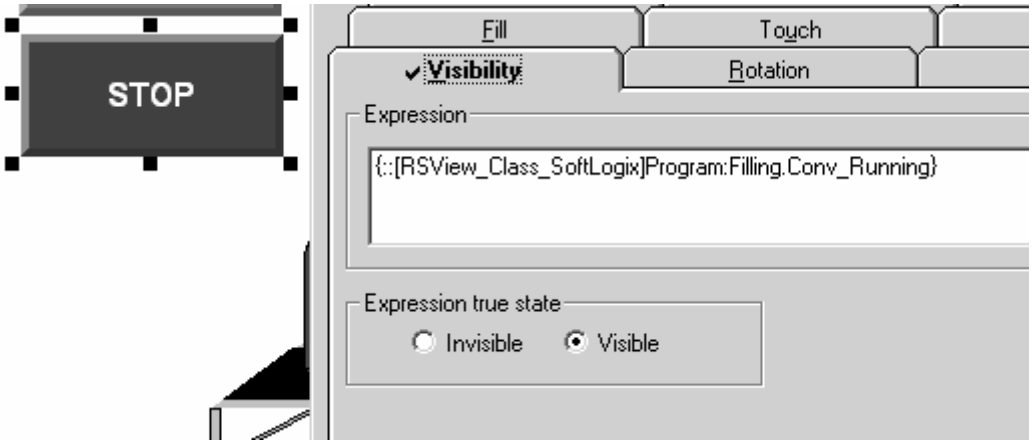
- Animate the height of the second rectangle, the one visible when the timer tag is greater than 5750. (You can leave the animation window open and just click on the object.) It should start at full length (100%), then contract to 38%.
    - Choose the tag from the **Tags** button.
    - Specify the percent change from a minimum of **100%** to a max of **38%**
    - Specify the height change to take place from **5750** to **6250** of the tag value
    - Anchor the height animation about the **top** of the rectangle

- Align the two gray rectangles so they are on top of each other. **Test Display** the graphic to see if the animations are functioning. Save the graphic display.

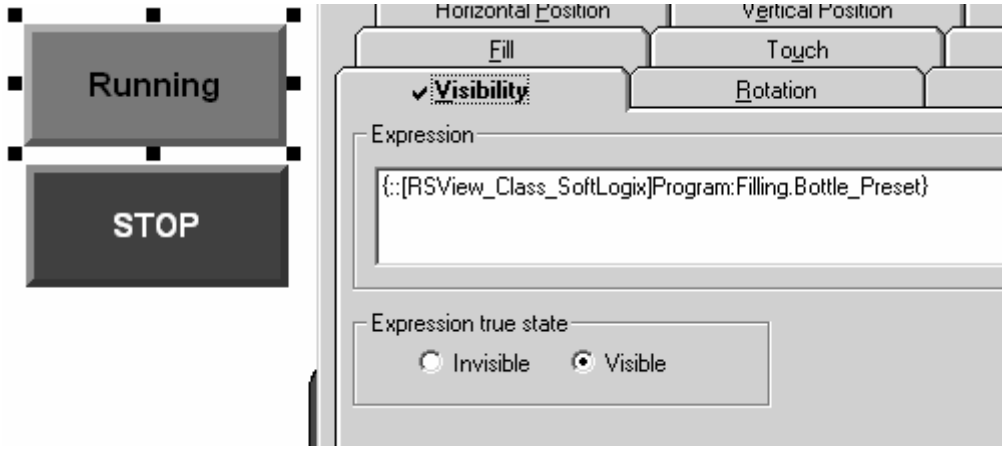


7. Animate the pushbuttons

- It doesn't make sense to show the **Stop** button when the bottling line is not moving. Place visibility animation on the button to only show it when the tag `{::[RSView_Class_SoftLogix ]Program:Filling.Conv_Running}` is true:



- Likewise, only show the START button if a non-zero number of bottles have been chosen to process (the Ramp buttons prevents this from being negative):



- Test run the graphic to make sure the animations are functioning. Make sure the **Local Message Display** is reporting the status of the bottles. Note that display navigation (the **Home** button) is not executed during a test run.

This Lab is Finished.

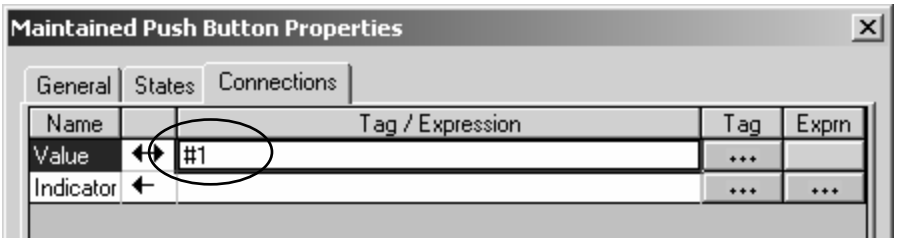
Tag Placeholders and Parameter Files

Tag placeholders and Parameter Files allow you to create one generic graphic display, and then substitute appropriate tags during runtime. For instance, you may have a tank farm with 10 identical setups of tanks, piping, pumps etc… Instead of creating separate graphics for each tank, you can create a single graphic display and multiple parameter files. The single graphic display would contain tag placeholders instead of actual tag names.

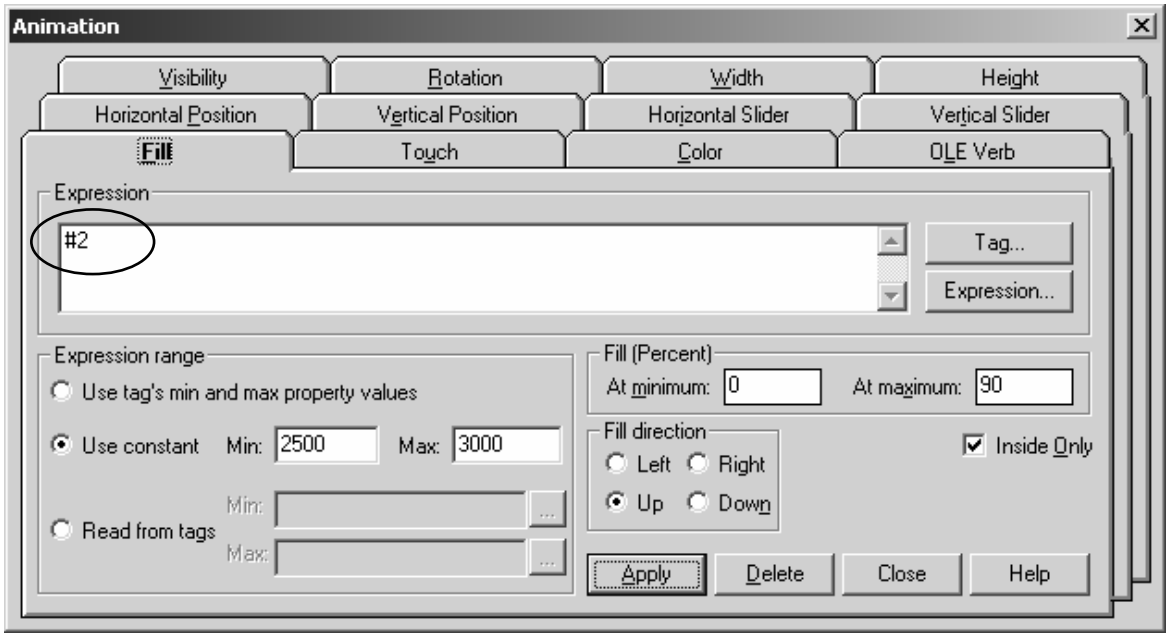
When the generic graphic display is shown, it will be associated with real tags. This association is made with the **Display** command. A display with tag placeholders uses a parameter file or a command string to swap tags for tag placeholders.

A tag placeholder is a crosshatch character (#) followed by a number from 1 to 500. Use a tag placeholder wherever you would use a tag.

Example: Use a tag placeholder in a Push Button:



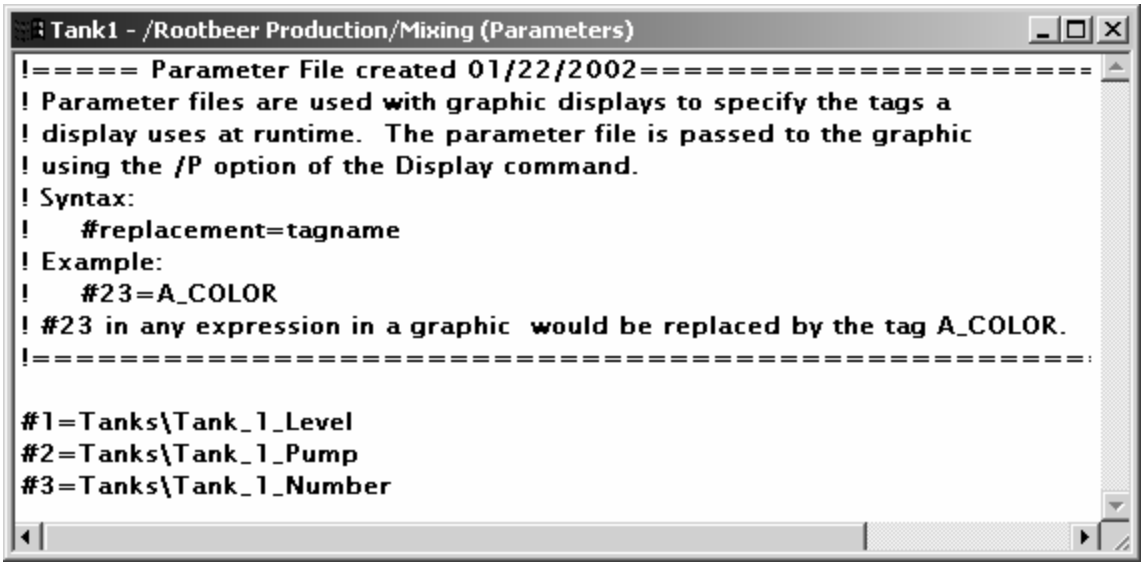
A tag placeholder in Fill animation:



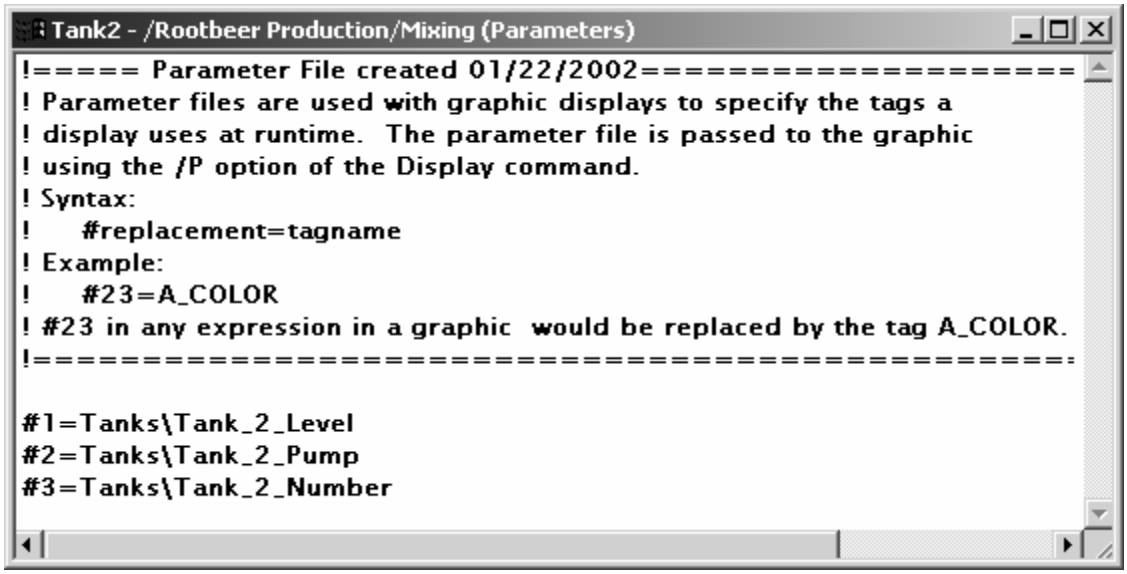
When the graphic is complete, create a parameter file. A new file can be created by clicking the **New** command in the **File** menu, by right-clicking the Parameter icon, or by dragging and dropping the Parameter icon to the right pane.

In the parameter file, simply associate the tag placeholder with the actual tag. Use the format: # tag placeholder = tagname

Any words preceded with the explanation mark (!) will be ignored. Use this to comment your file.


Tank1 - /Rootbeer Production/Mixing (Parameters)
!===== Parameter File created 01/22/2002=====
! Parameter files are used with graphic displays to specify the tags a
! display uses at runtime. The parameter file is passed to the graphic
! using the /P option of the Display command.
! Syntax:
! #replacement=tagname
! Example:
! #23=A_COLOR
! #23 in any expression in a graphic would be replaced by the tag A_COLOR.
!=====
#1=Tanks\Tank_1_Level
#2=Tanks\Tank_1_Pump
#3=Tanks\Tank_1_Number

Tip – To create another parameter file, you can perform a **Save As…** command from the **File** menu, and then edit the file:


Tank2 - /Rootbeer Production/Mixing (Parameters)
!===== Parameter File created 01/22/2002=====
! Parameter files are used with graphic displays to specify the tags a
! display uses at runtime. The parameter file is passed to the graphic
! using the /P option of the Display command.
! Syntax:
! #replacement=tagname
! Example:
! #23=A_COLOR
! #23 in any expression in a graphic would be replaced by the tag A_COLOR.
!=====
#1=Tanks\Tank_2_Level
#2=Tanks\Tank_2_Pump
#3=Tanks\Tank_2_Number

Displaying Graphics with Tag Placeholders

There are two way to associate a graphic containing tag placeholders with real tags.

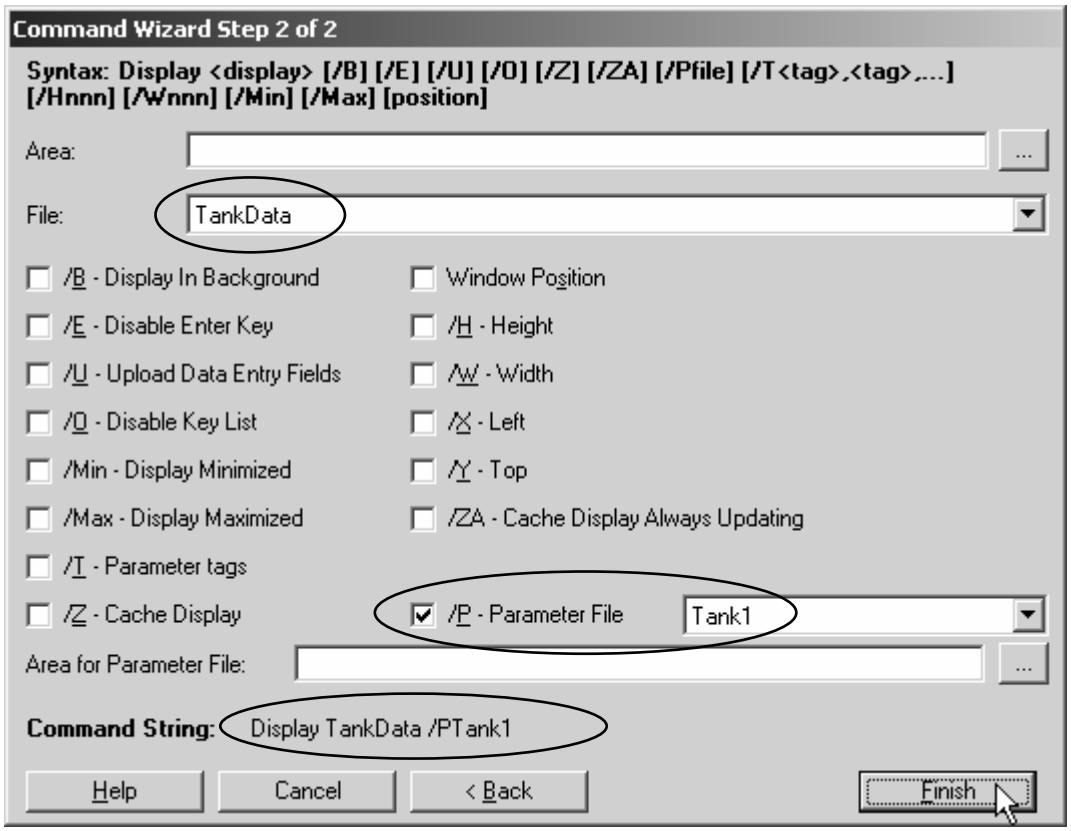
1. To use a parameter file issue the **Display** command with the **/P** switch:

```
Display /AreaName::GraphicName /Pparameterfilename
```

space space

If the graphic is in the Home Area, you do not need to specify the Area Name.

You can use the command wizard to build the command:




```
Display TankData /Ptank1
```

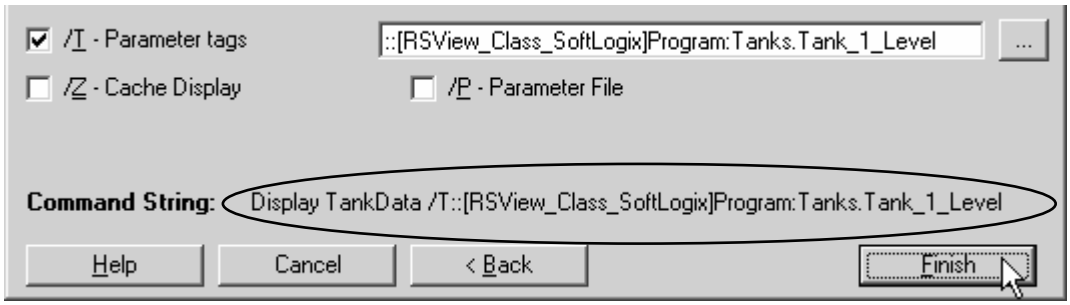
2. The second way to associate tags with the graphic is to use the /T switch with the Display command.

   This method does not use a parameter file. Rather, the tags to be substituted are specified as part of the command. In this example, tag1 will replace the #1 tag placeholder, tag2 for #2, tag3 for #3.

```
Display /AreaName::GraphicName /Ttag1,tag2,tag3
```

space space

   You can use the Command Wizard to build this command as well.

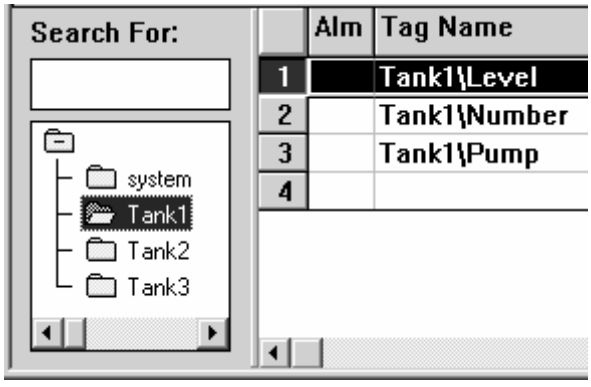


Tag Placeholders and Partial Tag Substitution

You may use tag placeholders to represent tag folders, or portions of directly referenced tags, as opposed to whole tag names. A graphic may contain references to:

```
#1\Level
#1\Number
#1\Pump
```

Rather than create a parameter file containing three tag reference, you may organize your tag database to be able to swap only the folder name:



In this case, you would issue this command to reference the above tags:

```
Display TankData /Ttank1
```

Lab 7 – Tag Placeholders in Graphic Displays

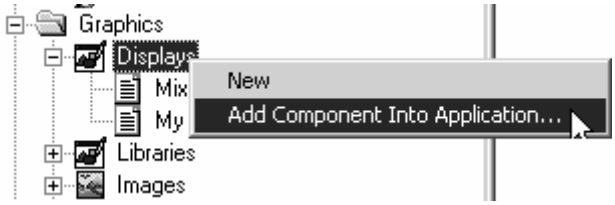
Objective: In this lab, you will edit a graphic display depicting a tank, a pump, and a trend. You will convert the hard-coded tags to tag placeholders so you may use the same graphic with many tanks.

Software Requirements:

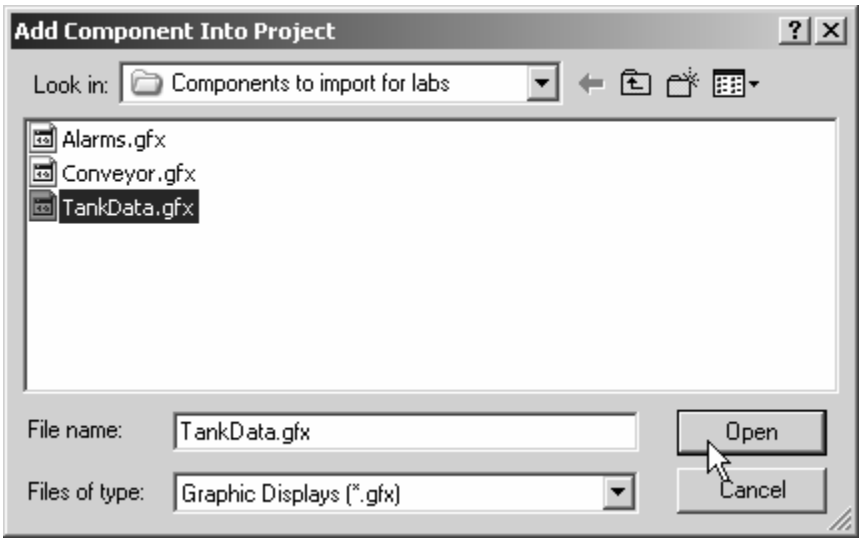
- RSView Studio
- SoftLogix 5860 running RSView_Class_SoftLogix program

1. Import the TankData graphic display into your project.

- Start with a pre-built display. Right-click on Displays and choose to Add Component Into Application



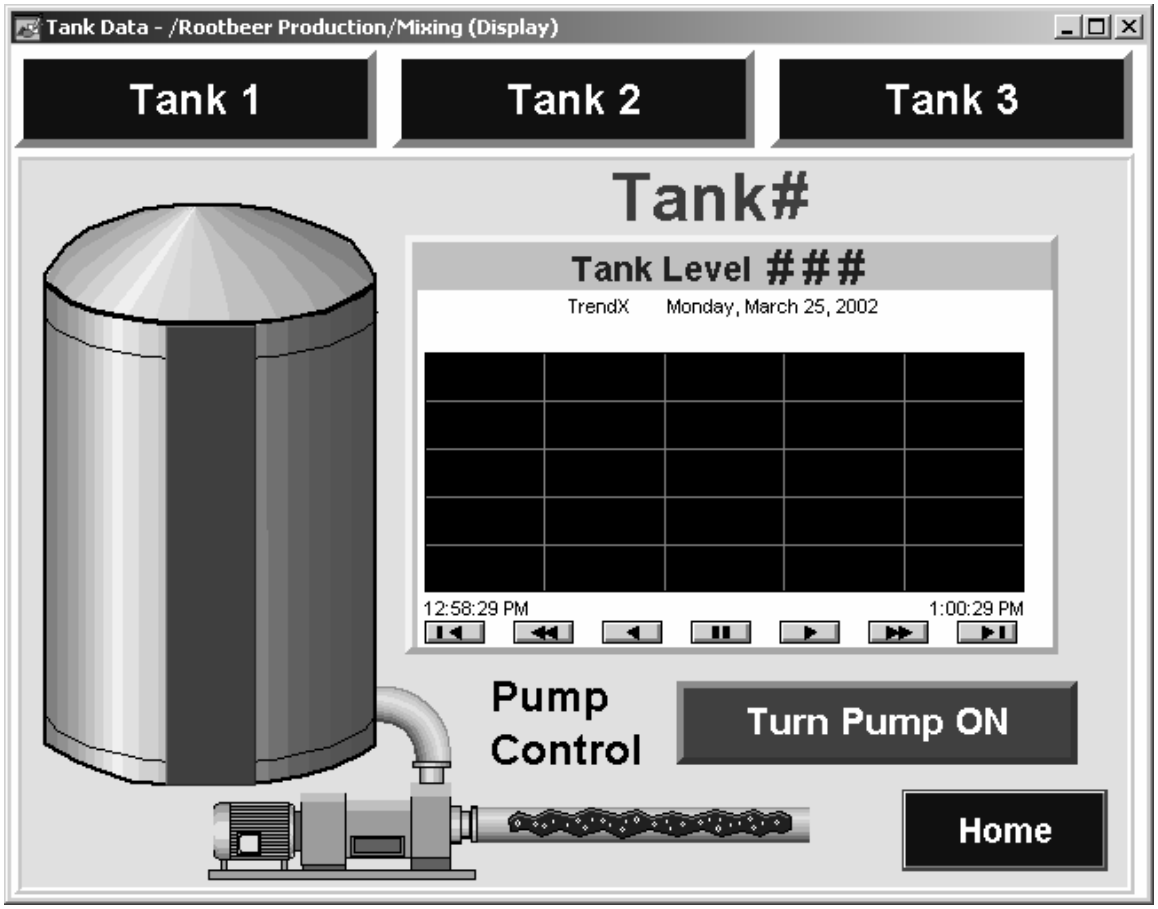
- Add the **TankData** display from the **Components to import for labs** directory.



2. Edit the TankData graphic display

The graphic display is configured to show data for Tank 1.

- Double-click the **Tank Data** display to open it.
- Test run the graphic display to confirm that Tank 1 data is active.
- The following 3 direct reference tags are used in the graphic:
    - [RSView_Class_SoftLogix]Program:Tanks.Tank_1_Level
    - [RSView_Class_SoftLogix]Program:Tanks.Tank_1_Pump
    - [RSView_Class_SoftLogix]Program:Tanks.Tank_1_Number



Use tag placeholders to make this graphic available to all 3 tank tags. There are different solutions to this:

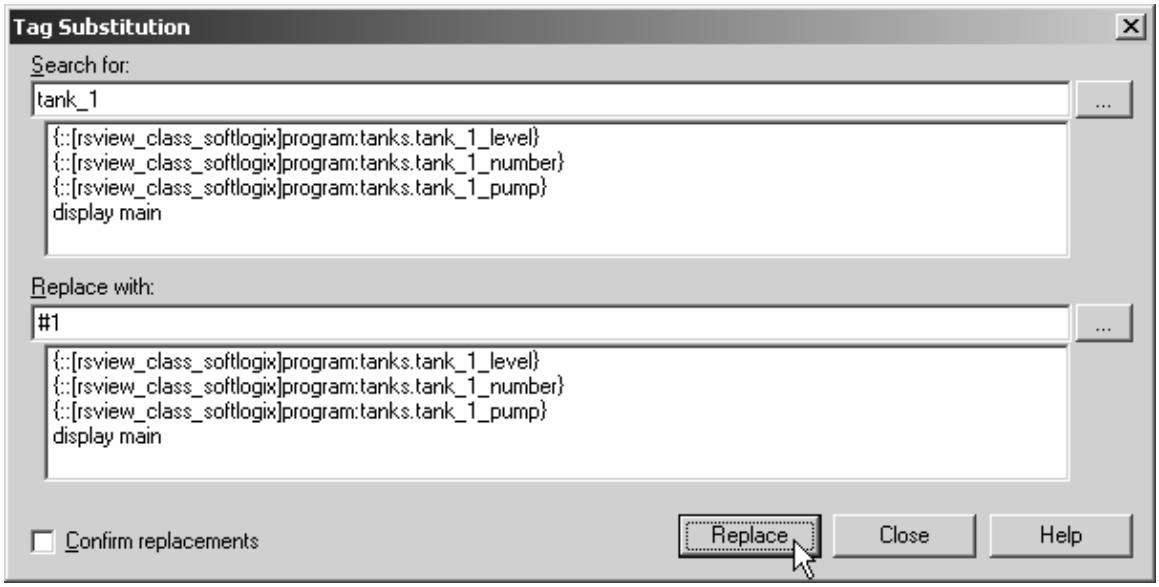
One possible solution is to create 3 parameter files. Each file would require 3 entries. Example:

- #1 = {::[RSView_Class_SoftLogix]Program:Tanks.Tank_1_Level}
- #2 = {::[RSView_Class_SoftLogix]Program:Tanks.Tank_1_Pump}
- #3 = {::[RSView_Class_SoftLogix]Program:Tanks.Tank_1_Number}

You would then substitute each tag for the tag placeholder in the graphic.

A simpler solution is to replace only what is unique about each tag. In this case, only the tank number differs in the controller tags. Perform these steps:

- Select every object in the graphic display (CTRL-A, or Edit menu)
- Invoke the Tag Substitution window (CTRL-R, or Edit menu)
- substitute **#1** for **tank_1** as shown:

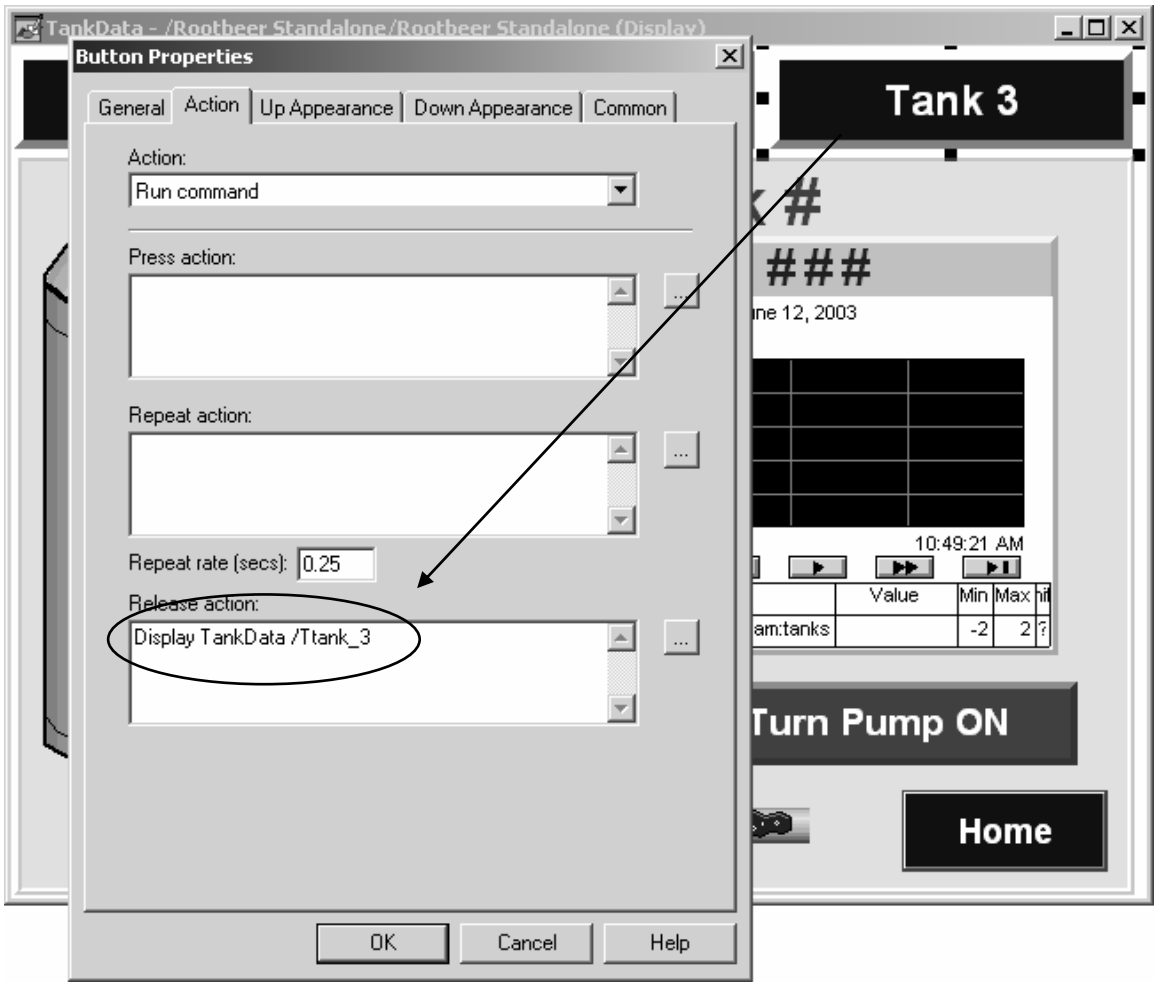


- Click Replace. Five instances of the tag should be replaced. Open a numeric display to confirm that the substitution has occurred.

- There is only one placeholder in this solution. Use the **Display /T** command to substitute the tank information at runtime:

```
Display TankData /TtankX
```

- Configure the three buttons at the top of the display. Clicking these buttons at runtime will display this same graphic with the individual tank data substituted for the tag placeholders. Double-click each button and click on the Action tab. Build a command to display the **Tank Data** graphic with the /T switch. You will have to type **tank_1** etc… Click **OK** when you are done.



- Save and Close the **Tank Data** graphic display.

Note: This solution lends itself to duplicating entire programmable logic controllers within an application. The duplicated processor will have only a different RSLinx Topic name. This portion of the tags may be substituted.

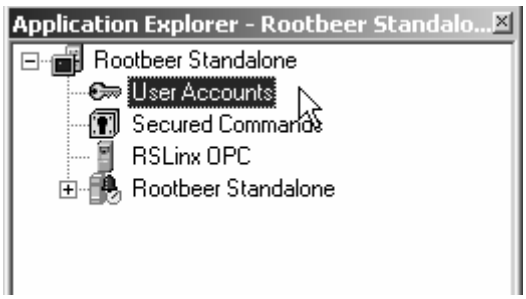
3. Test the graphic display

Display commands are ignored when issued from the RSView Studio design environment. An RSView SE Client must be configured to see how this graphic display works.

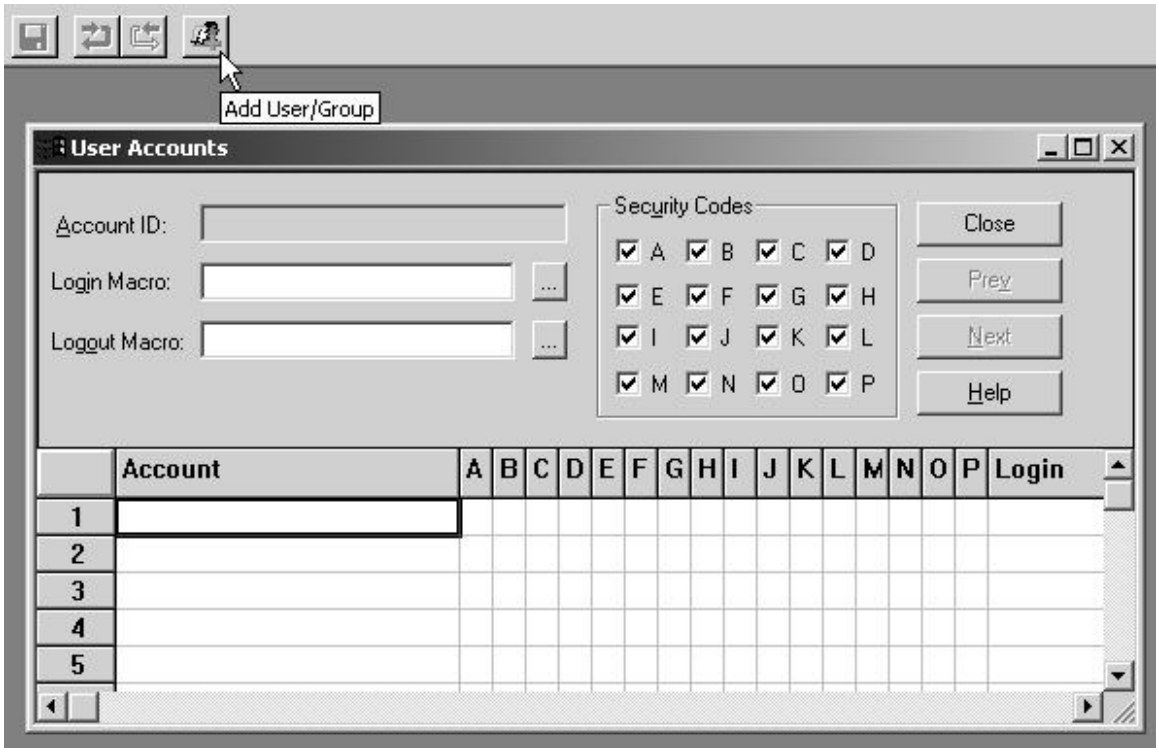
SE Client is the runtime operator interface. A 2 hour test client is included with RSView Studio.

The steps for creating a client to test the tag placeholders are detailed below.

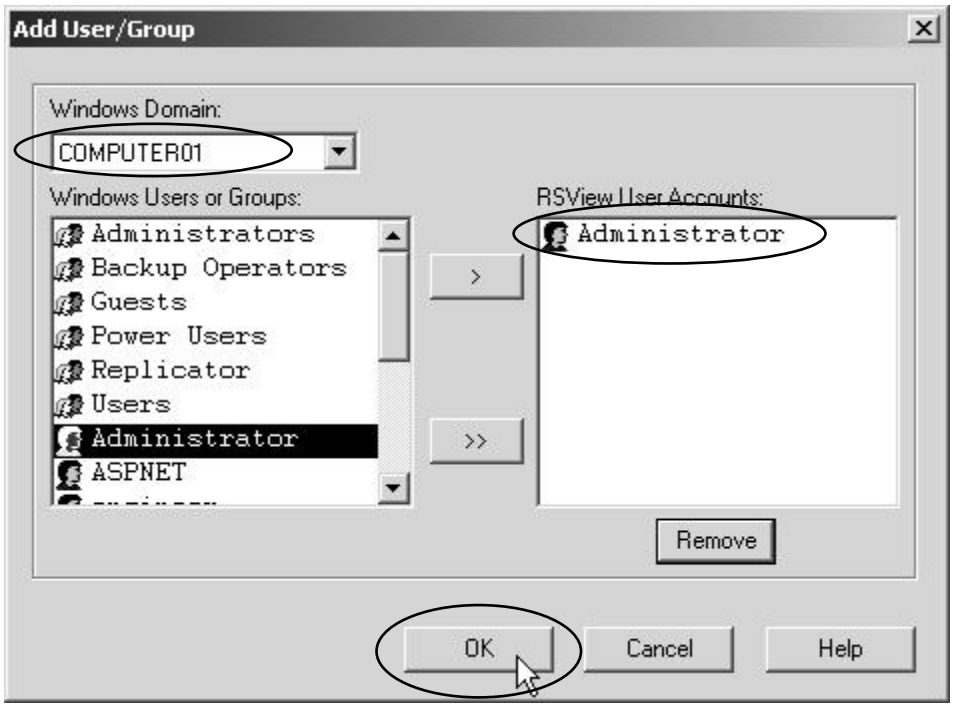
- Security – A valid user account must exist to run an SE Client. Security is covered in detail in chapter 12. For now, open the **User Accounts** editor in the application.



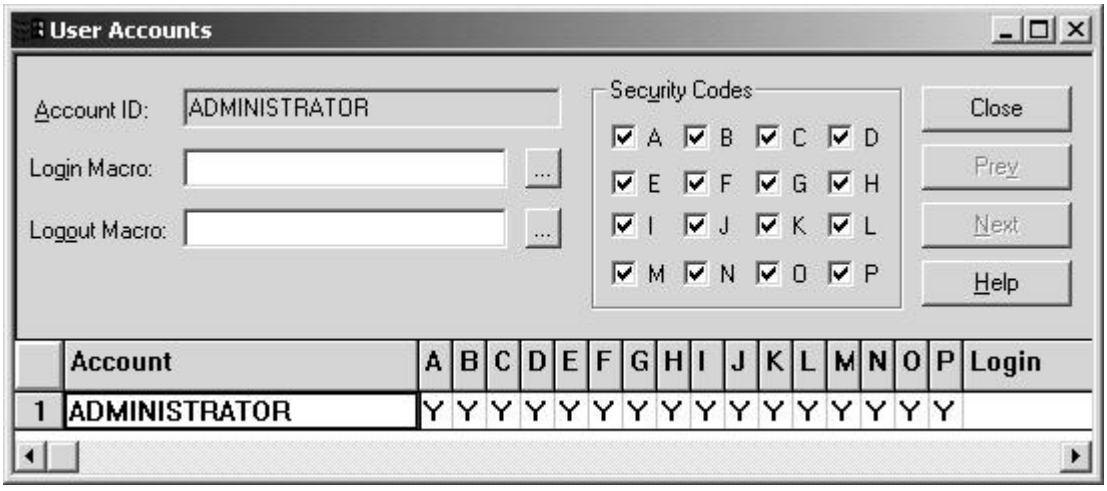
- The editor is initially empty. Select **Add User/Group** from the **Setup** menu, or click on the button:



- Select your local computer in the Windows Domain drop down box (unless your computer is part of a Domain, and not a Workgroup).
- Select the **Administrator** user account. Double click on the name, or click the > button to move it to the RSView User Accounts field.
- Click **OK** to close the editor.

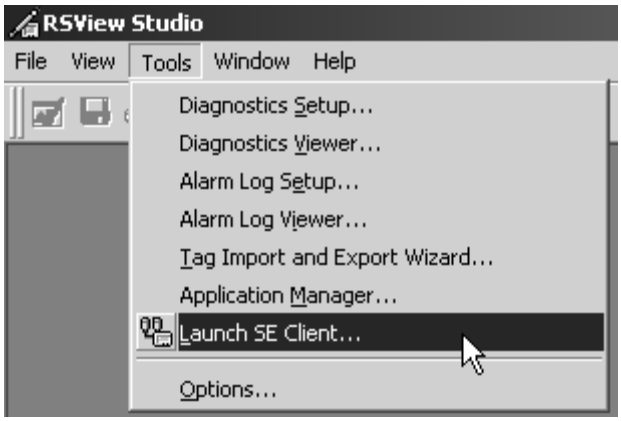


- The account is added. Keep all the default settings and click **Close** to exit the editor. Click **Yes** to save the changes.

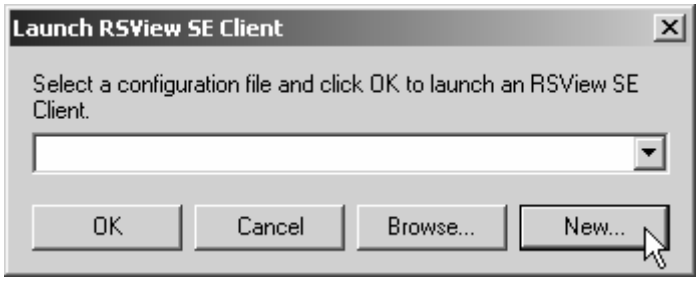


Create an SE Client. Each student will do these steps.

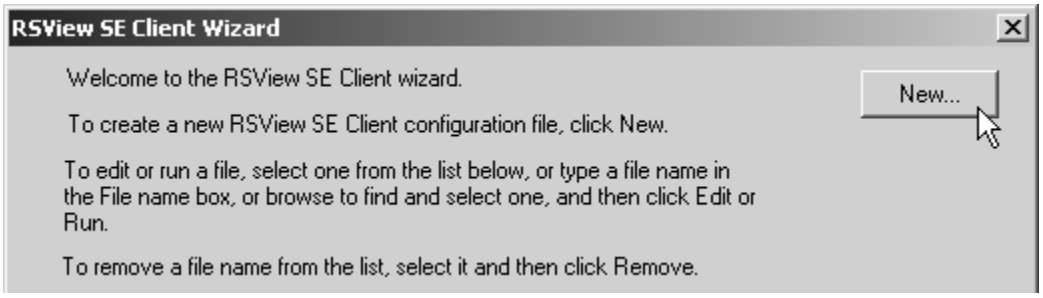
- Select **Launch SE Client** from the **Tools** menu.



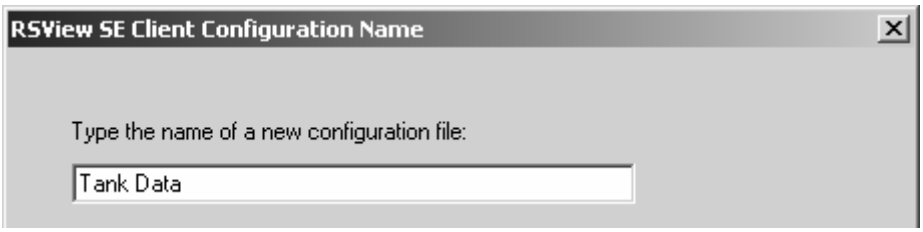
- Click **New**



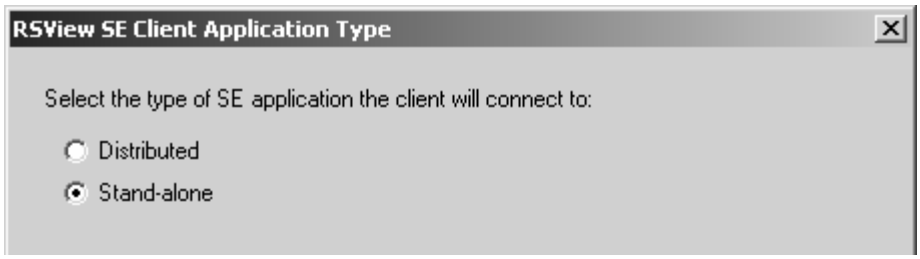
- Click **New** again in the RSView SE Client Wizard


RSView SE Client Wizard
Welcome to the RSView SE Client wizard.
To create a new RSView SE Client configuration file, click New.
To edit or run a file, select one from the list below, or type a file name in the File name box, or browse to find and select one, and then click Edit or Run.
To remove a file name from the list, select it and then click Remove.
New...

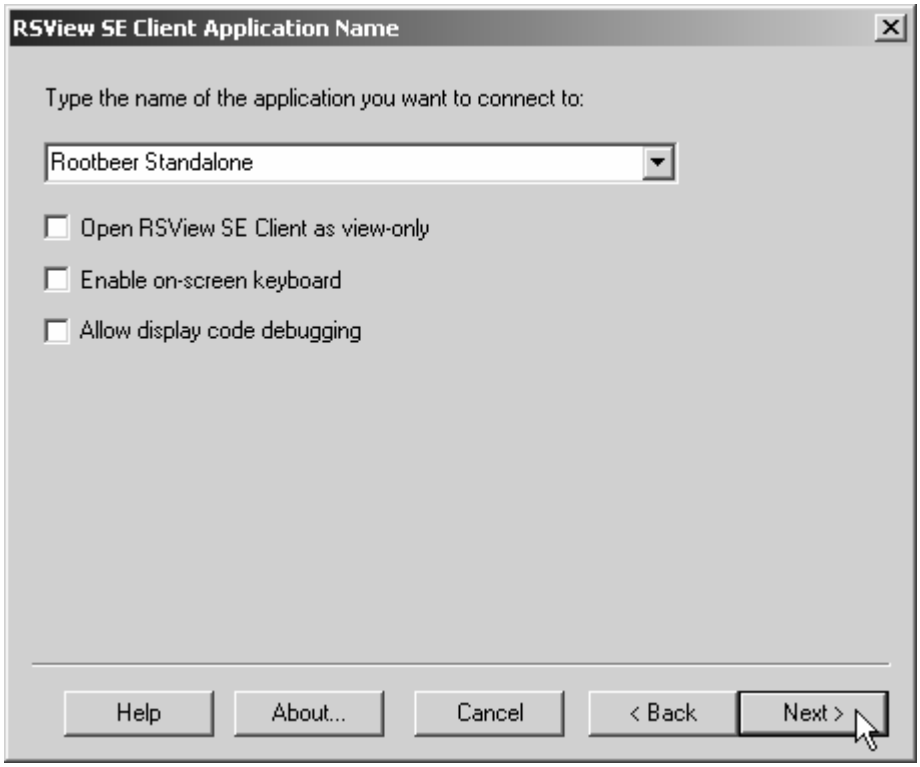
- Type **Tank Data** as the name of the client file. Keep the default location. Click **Next**.



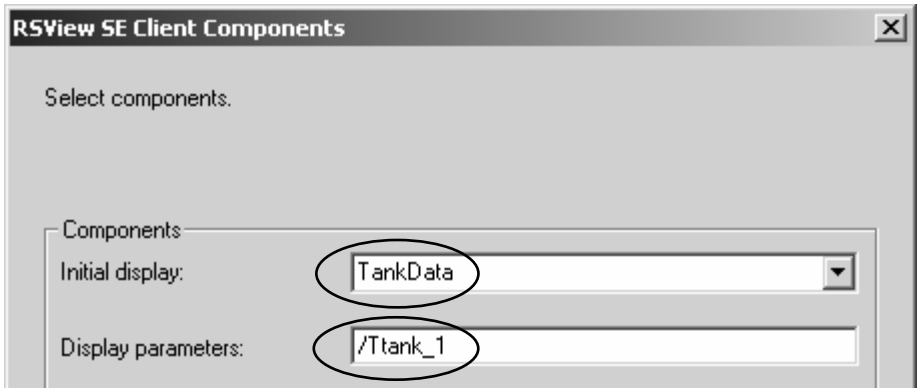
- Select the Stand-alone option. Click **Next**.


RSView SE Client Application Type
Select the type of SE application the client will connect to:
Distributed
Stand-alone

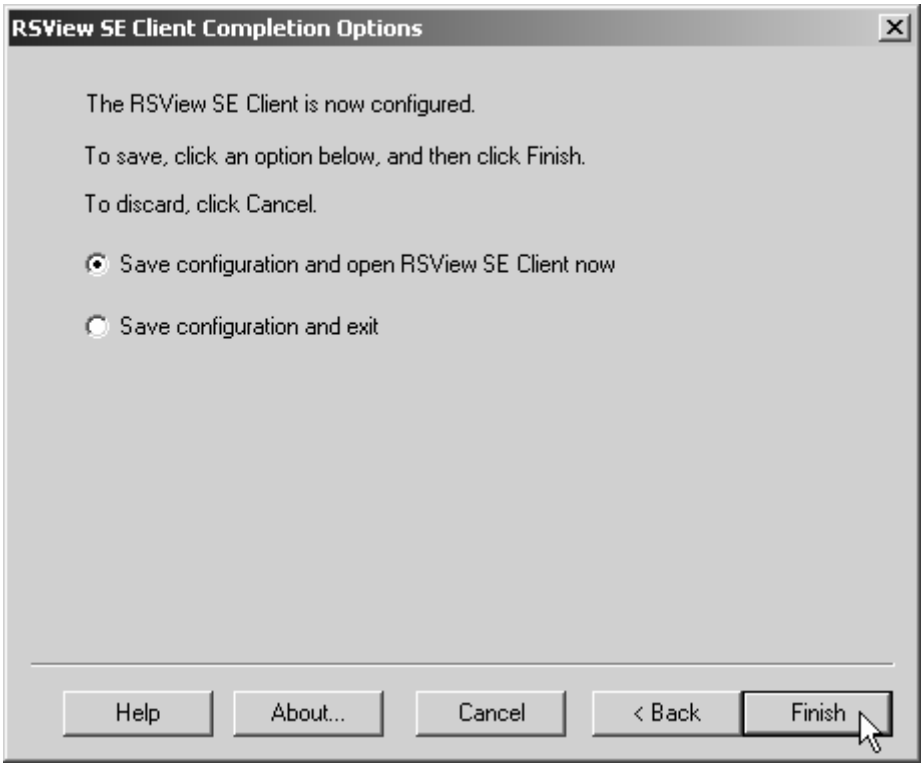
- Select your application. Click **Next**.



- Select the **Tank Data** graphic. Type `/Ttank1` (no spaces) in the Display parameters field. This modifies the Display command. Click **Next**.

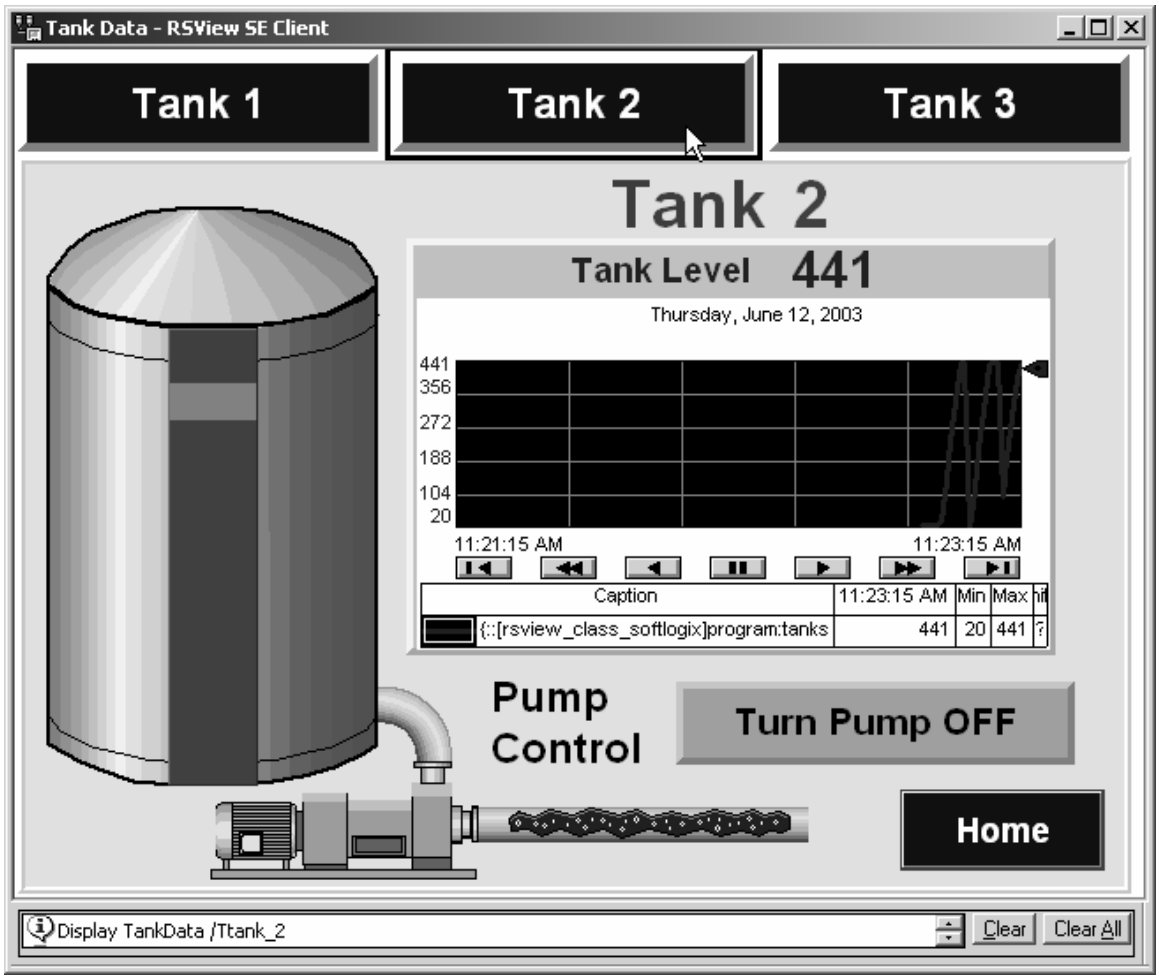


- Accept the defaults for the next two dialog boxes. Click **Finish** to save the settings and open the client file.


RSView SE Client Completion Options
The RSView SE Client is now configured.
To save, click an option below, and then click Finish.
To discard, click Cancel.
Save configuration and open RSView SE Client now
Save configuration and exit
Help
About...
Cancel
< Back
Finish

Test the Display

- The SE Client will open. Look at the Activity Bar for any errors generated.



- Click the buttons at the top and verify that you see the different tanks' data.
- Ignore the **Home** button. It will be used in a later lab.
- Close the SE client when you are done.

This Lab is Finished.

6. *Alarms*

Objectives:

- Describe how to use the Alarm system
- Configure general settings in the Alarm Setup Editor
- Configure Alarms on HMI tags
- Configure Alarm Logging using the Alarm Log Setup Tool
- Configure central alarm logging to an ODBC database
- Analyze Alarm log files using the Alarm Log Viewer
- Display Alarm information to an operator using
    - Alarm Summary object
    - Alarm system tags
- Configure when to start and stop alarming
- Understand the limits of alarmed tags per HMI Server

RSView Alarm Concepts

RSView Supervisory Edition incorporates a complete alarm system to alert an operator to any alarm state. Operators may acknowledge an alarm, and alarms are logged for historical purposes.

Alarms are monitored and logged at the HMI Server. If alarms are detected, they are annunciated at the RSView SE Client, where operators can view and acknowledge them.

With the RSView alarm system, you can:

- Monitor any analog and digital HMI tag for alarms (to a maximum of 40,000 tags per HMI server)
- Display the last 2,000 alarm transactions from each HMI server in an alarm summary
- Define up to eight different severity levels to distinguish alarms visually
- Use system default messages or create unique messages to describe an alarm log messages to a file, to a printer, or to both
- Suppress alarms for maintenance and tuning purposes
- Associate a command or macro with an alarm to provide custom handling of the alarm
- Share alarm information with other RSView components
- Set up global alarm monitoring
- Use the AlarmEvent command to respond to your own alarm detection algorithms for annunciation, logging, printing, and for display in alarm summaries

Note:

- You can only set up alarms on HMI tags that you create in the Tags editor.
- The maximum alarmable tags allowed is 40,000 per HMI server, 10,000 of which can be analog tags.
- Changes made to alarming in the Alarm Setup editor or to alarm tags will not take effect until the alarm server is stopped and restarted. You can use the `AlarmOff` and `AlarmOn` commands to do this.
- Alarm logging must be set up using the Alarm Log Setup editor on the same computer as the HMI server that will be monitoring the alarms. SE Clients do not monitor alarms – only HMI Servers.

The basic steps involved in setting up alarming for an application are:

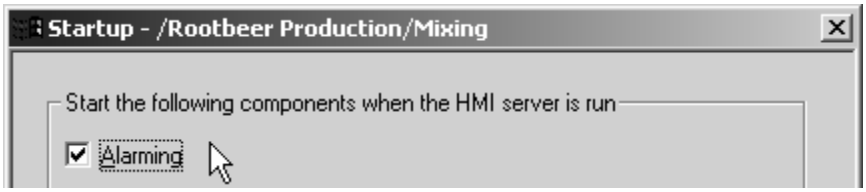
- In the Alarm Setup editor, define general features for all alarms. This is where you set up alarm annunciation and the destination of messages for each severity, and create messages that can take the place of the system default messages.

- Using the Alarm Log Setup tool, set up logging for all alarms. The alarm log file is a record of alarm incidents. You can specify where you want the alarm log file stored and when (or if) you want new log files created and old files deleted.

- In the Tags editor, define alarms for each HMI tag you want to monitor. To define an alarm for a tag specify the conditions that will trigger the alarm and assign a severity to it. You can define alarms for digital and analog tags, but not string tags.

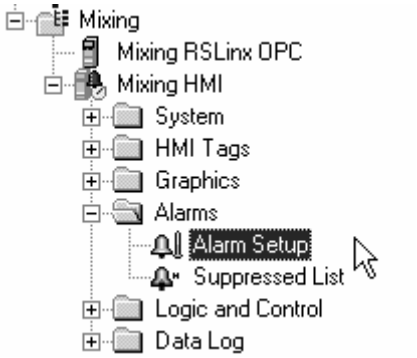
- Set up ways to display alarm information. For example, you can create a graphic display that contains an alarm summary or use the alarm system tags with other graphic objects in a display.

- Choose how to start and stop alarming and alarm logging. You may issue the `AlarmOff` and `AlarmOn` commands, or start alarming automatically in the **Startup** editor.



The Alarm Setup Editor

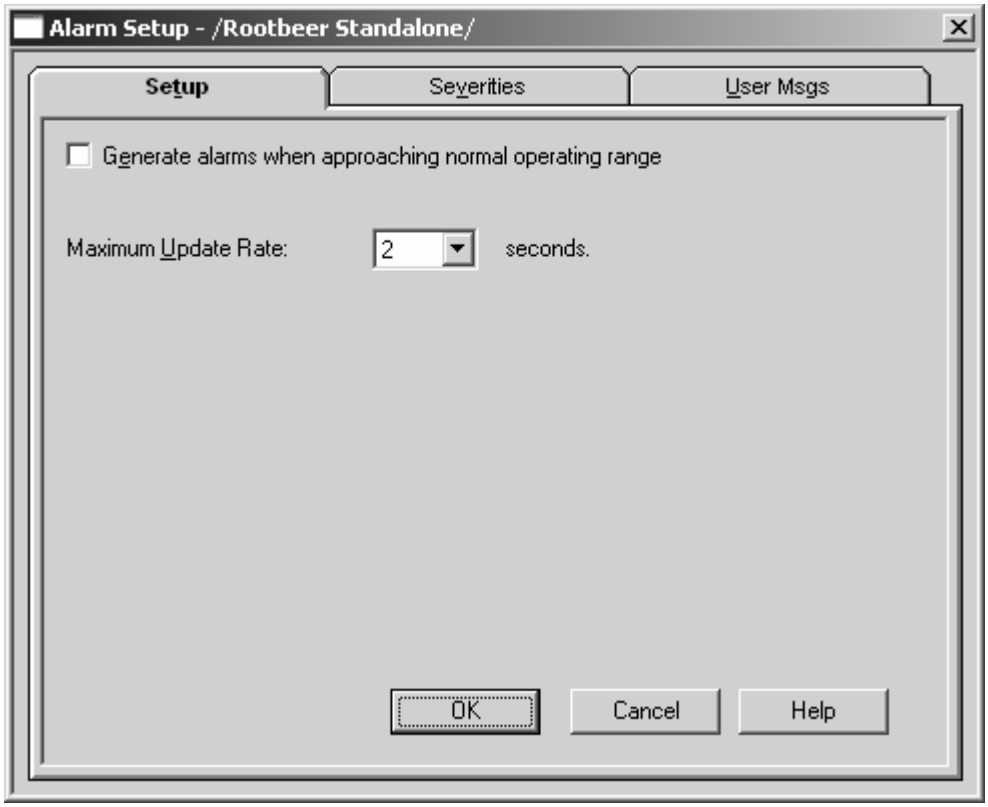
Configure general alarm settings with the Alarm Setup Editor. Open the editor from the Alarm folder in the HMI Project



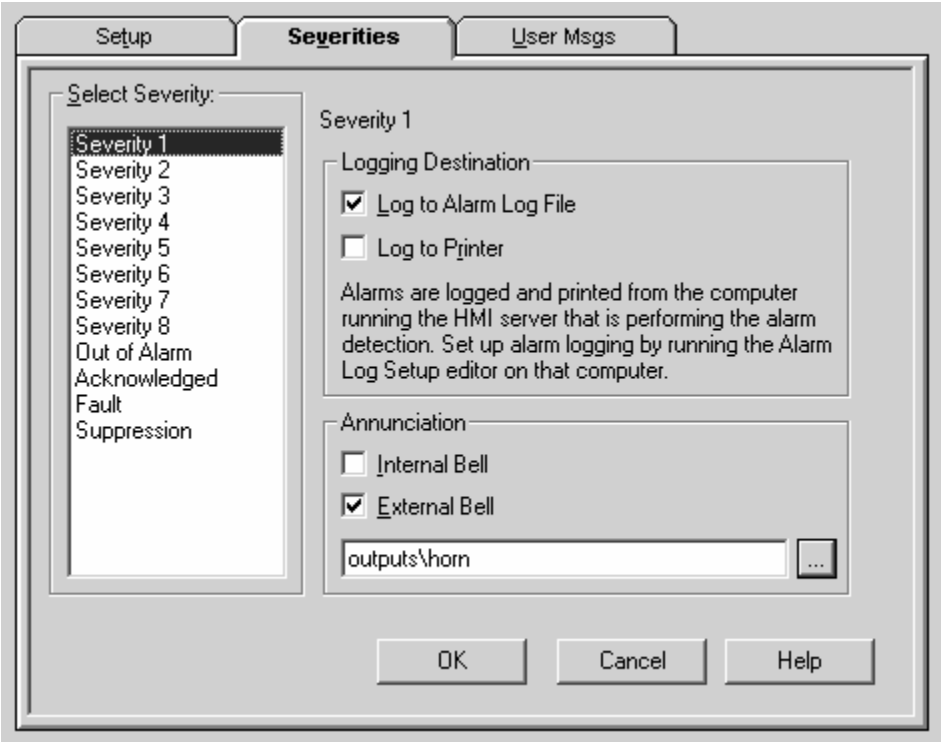
Setup tab

Generate alarms when approaching normal operating range
Check this input box if you want an alarm transaction to be generated if an analog tag value is moving back to the normal operating range when it crosses an alarm threshold. The alarm threshold can be increasing or decreasing.

Maximum Update Rate
Select a value from the list to specify the frequency at which HMI tags that have alarms defined for them will be scanned, or leave the default update rate of 2 seconds. The range of values is from 0.50 to 120 seconds.



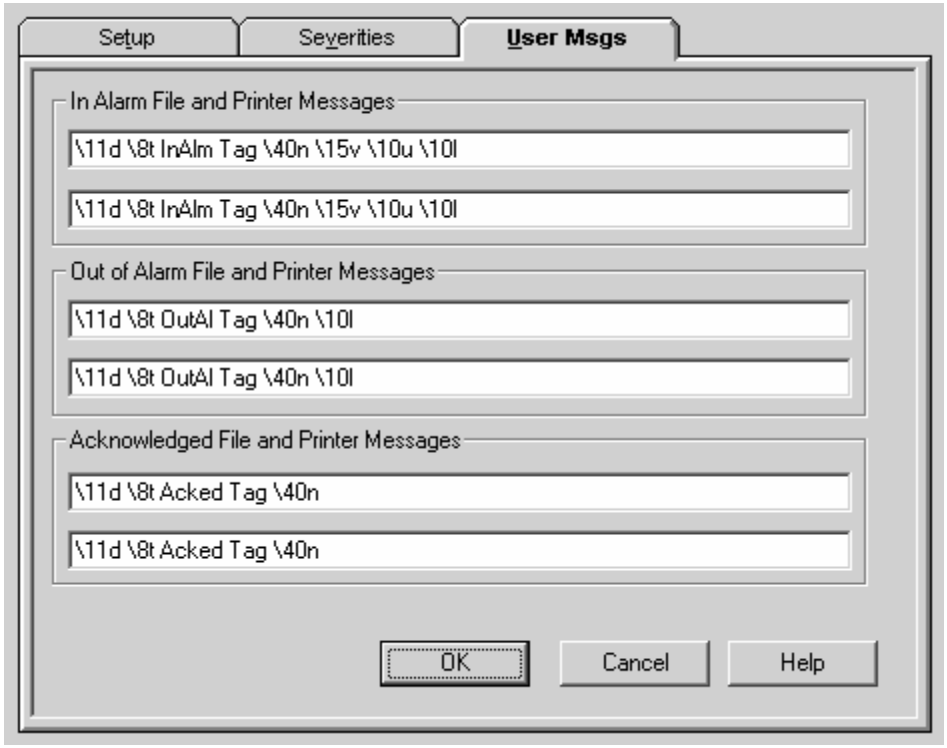
Severities tab



All alarms may be assigned a severity level. This is a way to organize alarms into groups. For each severity, configure a logging destination, and whether to enable the **internal bell** (the Windows exclamation sound), or an **external bell** (a digital tag that will energize a bit in the controller. This bit is reset when an operator acknowledges or silences an alarm).

User Messages

When an alarm is generated, a message will be sent to the log file, and/or a printer (if configured). Configure a default **user message** for all alarms here. This default message may be overridden at the tag level by a **system message** (which cannot be edited) or a **custom message**.


Setup
Severities
User Msgs
In Alarm File and Printer Messages
\11d \8t InAlm Tag \40n \15v \10u \10l
\11d \8t InAlm Tag \40n \15v \10u \10l
Out of Alarm File and Printer Messages
\11d \8t OutAl Tag \40n \10l
\11d \8t OutAl Tag \40n \10l
Acknowledged File and Printer Messages
\11d \8t Acked Tag \40n
\11d \8t Acked Tag \40n
OK
Cancel
Help

In the User Messages tab you can create message contents that can be used for any alarm. To select them for a particular alarm, you click the User Defaults button when you are setting up the messages for an alarm in the Analog or Digital Alarm editor.

Alarm messages can contain words and placeholders. Placeholders are replaced by current information when the message is sent. Placeholders can be upper or lowercase, and must be preceded by a backslash (\). You can specify a fixed amount of space for the information generated by placeholders, by putting a number between the backslash and the character.

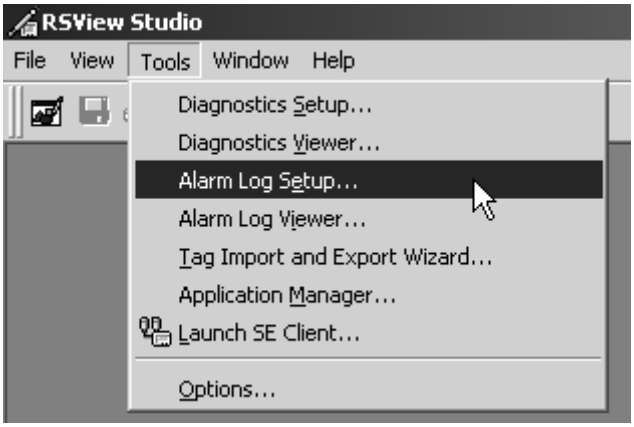
Placeholder	Information
\d	date of the message
\t	time of the message
\n	name of tag in alarm
\c	current value of tag in alarm
\v	threshold value that was crossed
\s	tag description of tag in alarm
\l	alarm label of current alarm
\u	units

The Alarm Log Setup Tool

With the Alarm Log Setup tool you set up the logging path, file management, and central logging.

To set up alarm logging:

1. Open the editor by clicking **Alarm Log Setup** in the **Tools** menu, or Select Programs/Rockwell Software/RSView Enterprise/Tools/SE Alarm Log Setup from the Windows Start menu.
2. In the Logging tab specify the logging paths, and whether or not to use long file names.
3. In the File Management tab specify when to start new log files and delete old ones.
4. In the Central Logging tab you can choose to log alarms to a central database via ODBC, specify how frequently logging will take place, select the data source name and target table, and set up security for the central database.



Tips

- Every HMI Server in your application may generate alarms. These settings apply to the computer containing the HMI server, not to the application. All alarm data for this computer will use the same path.
- Alarm logging must be set up using the Alarm Log Setup editor on the same computer as the HMI server that will be monitoring the alarms.
- If you are going to use an ODBC data source, it cannot have the same name as the HMI project and must be either a System or File ODBC data source.

Logging to a Network Drive

If you are logging to a network drive, network share, or ODBC database that is not located on the same computer as the HMI server, you must change the Windows security settings of the alarm log program files.

To change the security account of the alarm log program files in Windows 2000

1. On the computer on which you want to run alarm monitoring, click the Windows Start button, and then click Run.
2. In the Open box, type **dcomcnfg**, and then press Enter. If DCOM Configuration Warning messages appear, click No for each one.
3. In the Distributed COM Configuration Properties dialog box, click the Applications tab.
4. In the Applications list, click RsAlmLogExpServ, and then click Properties.
5. In the RsAlmLogExpServ Properties dialog box, click the Identity tab.
6. Click 'The interactive user'.
7. Click OK.
8. In the Applications list, click RsAlmLogService Class and then click Properties.
9. In the RsAlmLogService Class Properties dialog box, click the Identity tab.
10. Click 'The interactive user'.
11. Click OK.
12. Restart the computer.

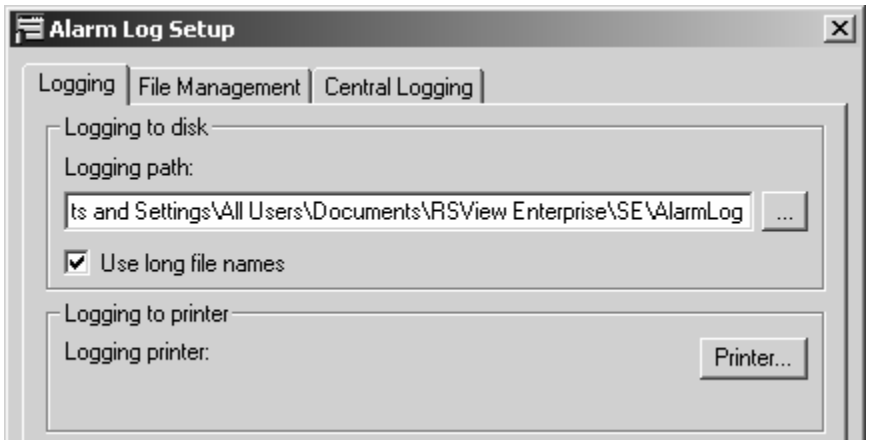
Tip - If the location of the remote database has been specified using a UNC path, in steps 6 and 10 you should specify 'This user' instead of 'The interactive user' and then type the name and password of a user that has access to the network share or database.

To change the security account of the alarm log program files in Windows XP

1. On the computer on which you want to run alarm monitoring, click the Windows Start button, and then click Run.
2. In the Open box, type dcomcnfg, and then press Enter.
3. In tree view (left-hand side) of the Component Services window, double-click the Component Services icon, double-click the Computers folder, double-click the My Computer icon, and then double-click the DCOM Config folder. If DCOM Configuration Warning messages appear, click No for each one.
4. In the list of DCOM Config applications on the right-hand side of the Component Services window, scroll down to RsAlmLogExpServ.
5. Right-click RsAlmLogExpServ and then click Properties on the context menu.
6. In the RsAlmLogExpServ Properties dialog box, click the Identity tab.
7. Click 'The interactive user'.
8. Click OK.
9. In the list of DCOM Config applications, right- click RsAlmLogService Class and then click Properties.
10. In the RsAlmLogService Class Properties dialog box, click the Identity tab.
11. Click 'The interactive user'.
12. Click OK.
13. Restart the computer.

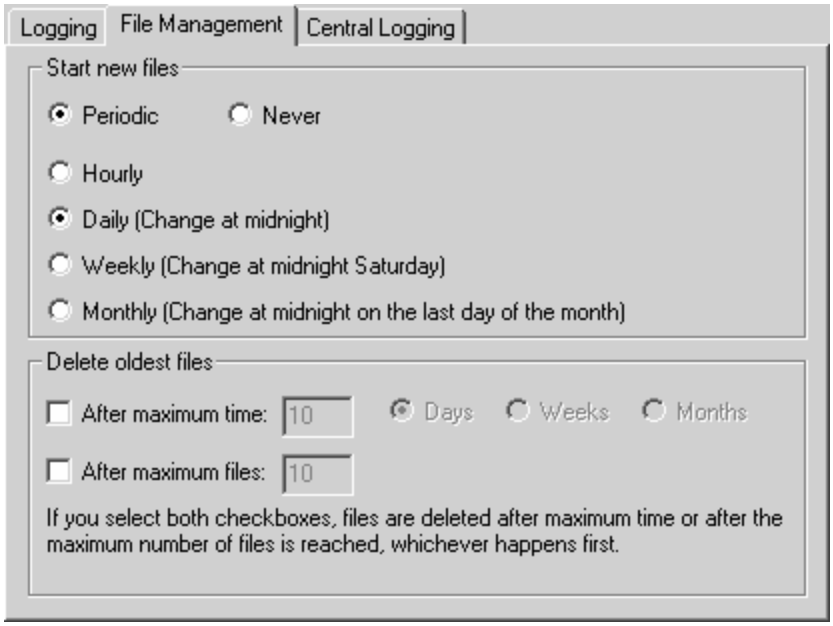
Tip - If the location of the remote database has been specified using a UNC path, in steps 7 and 11 you should specify 'This user' instead of 'The interactive user' and then type the name and password of a user that has access to the network share or database.

Logging Tab



Configure a path to log alarm files. Specify a printer if you will be logging to one.

File Management



In the File Management tab you define when new files are started and old files are deleted. Log files are named automatically by the system.

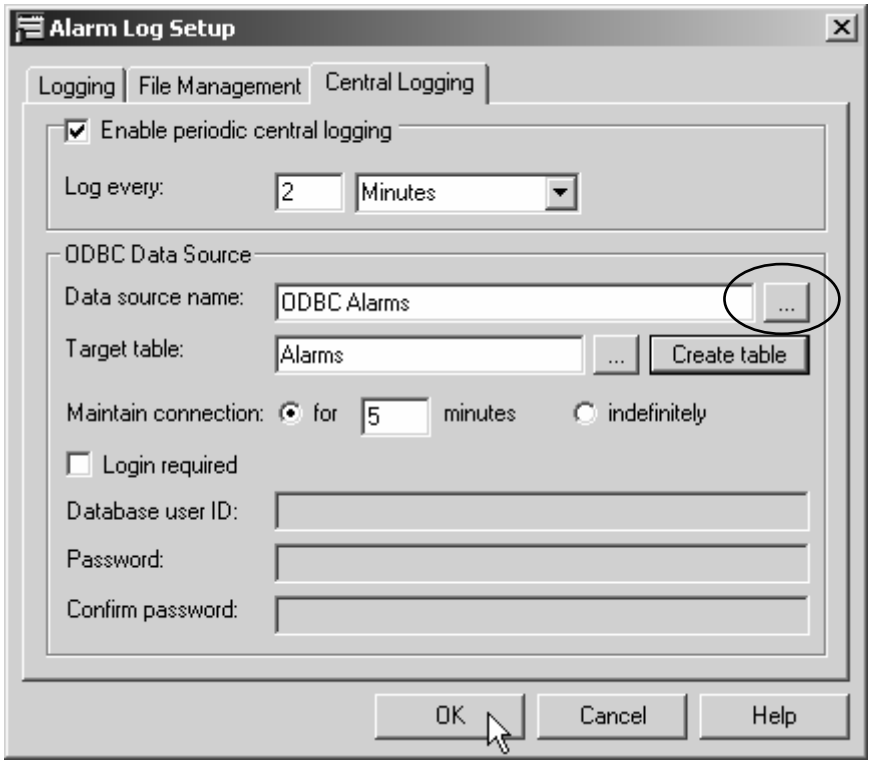
You can start a new file at anytime by issuing the `AlarmLogNewFile` command. This creates a new alarm log file on the computer containing the HMI server. All subsequent alarm messages will be logged to the new file.

Central Logging

In addition to logging to file sets, you can optionally set up RSView to automatically log data to a central, ODBC-compliant database. Central logging works by periodically exporting the contents of the alarm log file to an ODBC-compliant database.

RSView supports the following ODBC-compliant databases: Microsoft Access, Sybase SQL Server, Oracle, and Microsoft SQL Server.

If you have set up file management to delete the oldest files when a new set is started, and you are exporting data to an ODBC database, make sure you export the data before the oldest files are deleted.



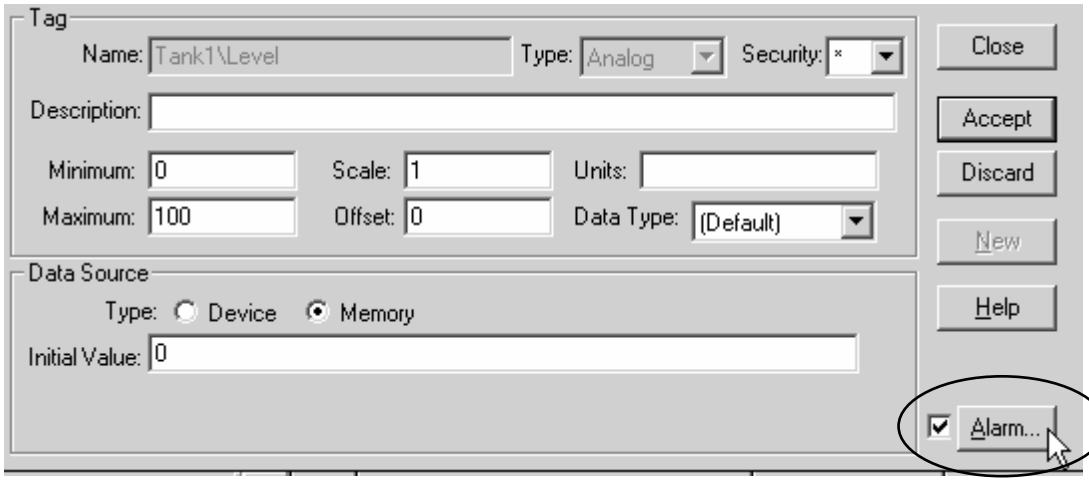
Specify a Windows ODBC Data Source Name. Click the browse button to show the **Select Data Source** dialog box. Select or create a new Data Source Name from there.

Alarm log files may be manually logged to an ODBC-compliant database by using the command `AlarmLogSendToODBC`.

Defining Alarms on Tags

Alarming is detected at the HMI tag level. Data Server tags do not support alarming at this time.

Alarming is applied to a tag by selecting the **Alarm** checkbox in the Tag Database editor.



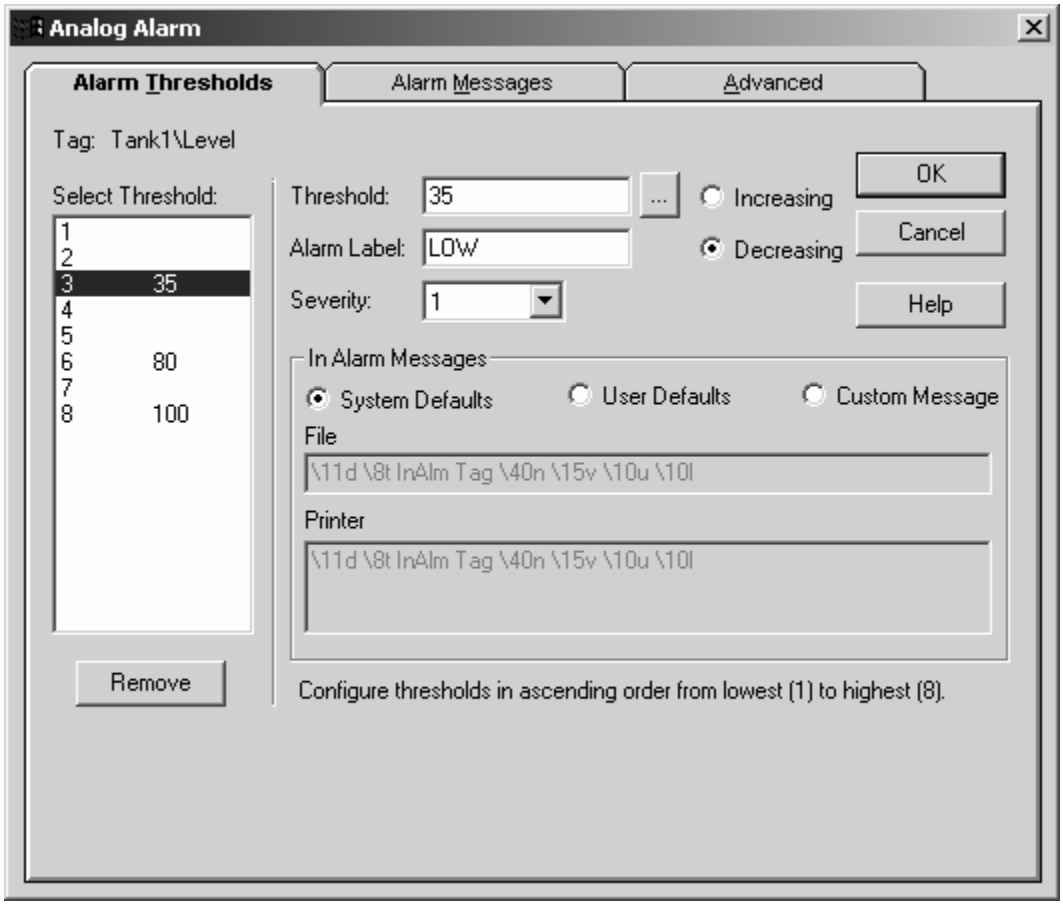
Alarms may be applied to Analog or Digital tags.

The maximum alarmable tags allowed is 40,000 per HMI server, 10,000 of which can be analog tags.

Analog Tag alarms

- Open the Tags editor, then select the analog tag for which you want to configure an alarm.
- Check the Alarm checkbox to open the Analog Alarm editor.
- In the Thresholds tab, specify the alarm thresholds, assign severities, and choose the message (In Alarm message) that will be sent when the threshold is crossed.
- In the Alarm Messages tab, specify the Out of Alarm and Acknowledge messages that will be sent to the alarm log file and/or the printer.
- In the Advanced tab, configure advanced features such as an alarm identification macro or command, deadband, and handshake.
- Click OK when the alarm set up for the tag is complete.
- Click Accept in the Tags editor to save the alarm information.

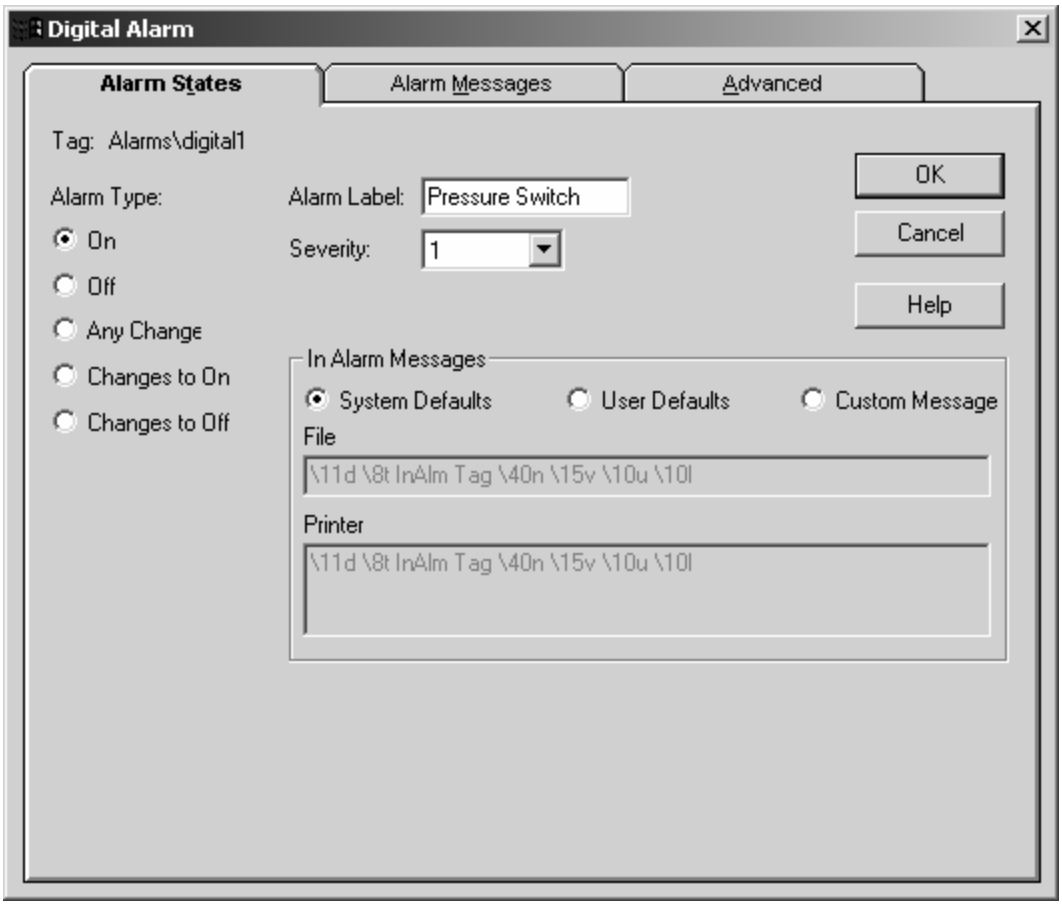
An analog tag triggers an alarm when its value crosses the thresholds set up for it. When you specify a tag as the threshold for an alarm, the threshold is variable because its value changes as the tag does. An alarm fault occurs when a variable threshold becomes higher than the threshold above it or lower than the threshold below it.



Digital Tag Alarms

To set up an alarm for a digital tag:

- Open the Tags editor, then select the digital tag you want to set up an alarm for.
- Check the Alarm checkbox to open the Digital Alarm editor.
- In the Alarm States tab, specify the alarm type, assign severities and choose the message that will be sent when the tag goes into alarm.
- In the Alarm Messages tab, specify the Out of Alarm and Acknowledge messages that will be sent to the alarm log file and/or the printer.
- In the Advanced tab, set up advanced features such as alarm identification macro or command, and alarm acknowledge and handshake behavior.
- Click OK when the alarm set up for the tag is complete.
- Click Accept in the Tags editor to save the alarm information.



Alarm System Tags

System tags are created and updated on the HMI server that Alarming is running. You can use them anywhere a tag name is required. The system tags for alarms are:

`system\AlarmBanner` (string)

Contains the most-severe, most-recent alarm in the HMI server. If an alarm of an equal or higher severity occurs, it replaces the first alarm, whether or not the previous alarm has been acknowledged. At run time, date and time information stored in this tag is displayed in the format specified by the Regional Settings in the Windows Control Panel.

`system\AlarmMostRecentDate` (string)

Contains the date of the most-severe, most-recent alarm in the HMI server. At run time, the date stored in this tag is displayed in the format specified by the Regional Settings in the Windows Control Panel.

`system\AlarmMostRecentLabel` (string)

Contains the threshold label of the tag of the most-severe, most-recent alarm in the HMI server.

`system\AlarmMostRecentSeverity` (analog)

Contains the severity of the most-severe, most-recent alarm in the HMI server.

`system\AlarmMostRecentTagDesc` (string)

Contains the description of the tag of the most-severe, most-recent alarm in the HMI server.

`system\AlarmMostRecentTagname` (string)

Contains the name of the tag of the most-severe, most-recent alarm in the HMI server.

`system\AlarmMostRecentTime` (string)

Contains the time of the tag of the most-severe, most-recent alarm in the HMI server. At run time, the time stored in this tag is displayed in the format specified by the Regional Settings in the Windows Control Panel.

`system\AlarmMostRecentUnits` (string)

Contains the units of measurement of the most-severe, most-recent alarm in the HMI server.

`system\AlarmStatus` (string)

Contains the number of unacknowledged and suppressed alarms in the HMI server.

`system\AlarmSummaryItems` (analog)

Contains the number of alarm transactions in the HMI server.

`system\AlarmSummaryItemsUnacked` (analog)

Contains the number of unacknowledged alarms in the HMI server.

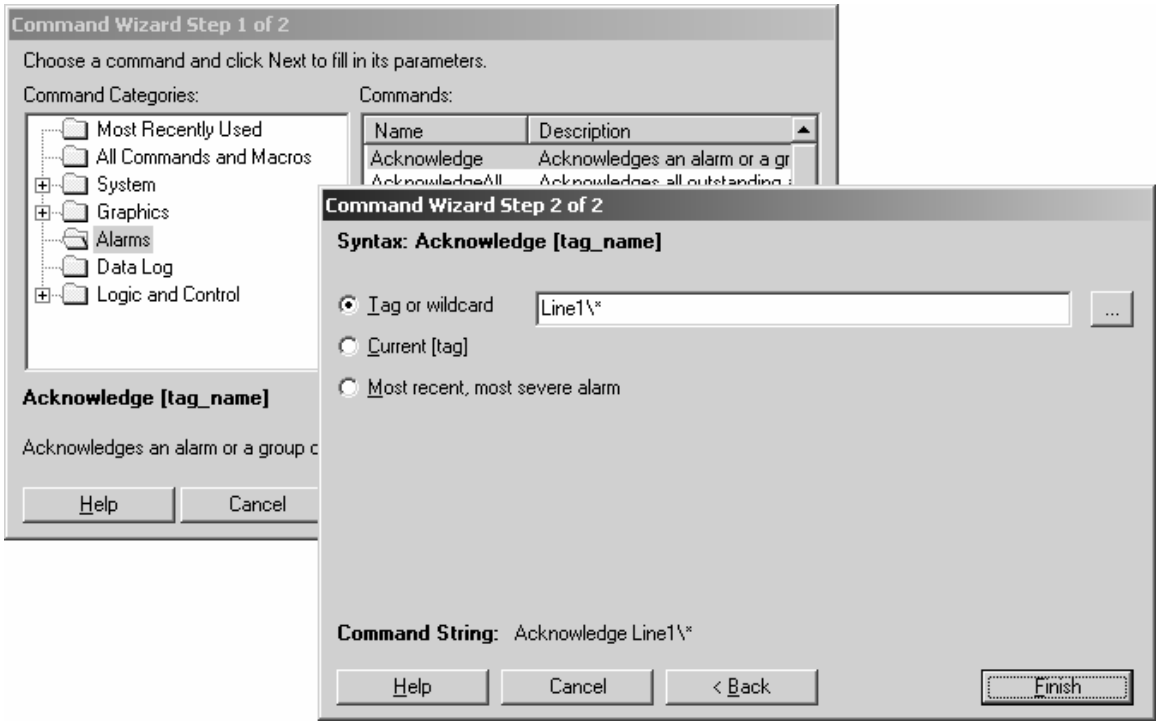
`system\AlarmSuppressedCount` (analog)

Contains the number of tags with alarm suppression turned on in the HMI server.

Grouping Alarms

You may create alarm groupings in different ways. Organizing your tag database into folders allows you to group alarms. Alarms may be acknowledged by the command: **`acknowledge <tag>`**

For example, issuing the command **`Acknowledge Line1\*`** will acknowledge all tags in the Line1 folder.



Alarm severities may also be used to group alarms together. Severities may be dealt with individually in the Alarm Setup editor. For example, you could make all the lowest level alarms a separate severity, and choose to filter them out of the alarm summary, alarm log, or printer.

The Alarm Summary Object

An operator will interact with alarms though the Alarm Summary object in a graphic display. This object will display alarm information and allow an operator to take actions with an alarm:

- Acknowledge
- Silence
- Filter
- Sort

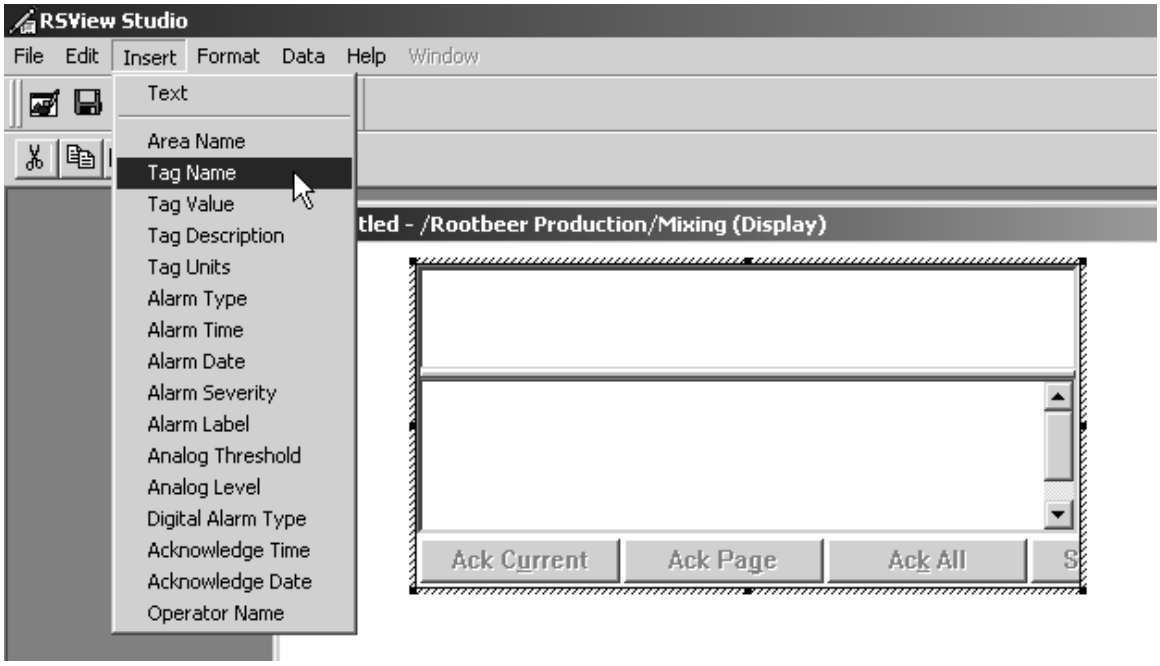
In addition, an operator may

- Execute – carry out a command or macro from the alarm summary
- Identify – carry out a command or macro for a particular alarmed tag

Create an alarm summary by opening a graphic display and selecting the Alarm Summary object from the **Objects, Advanced** menu.

Drag a rectangle to fill the space you wish the alarm summary to occupy. When you release the mouse, the alarm summary will be in edit mode.

Use the **Insert, Format** and **Data** menus to configure the Alarm Summary.

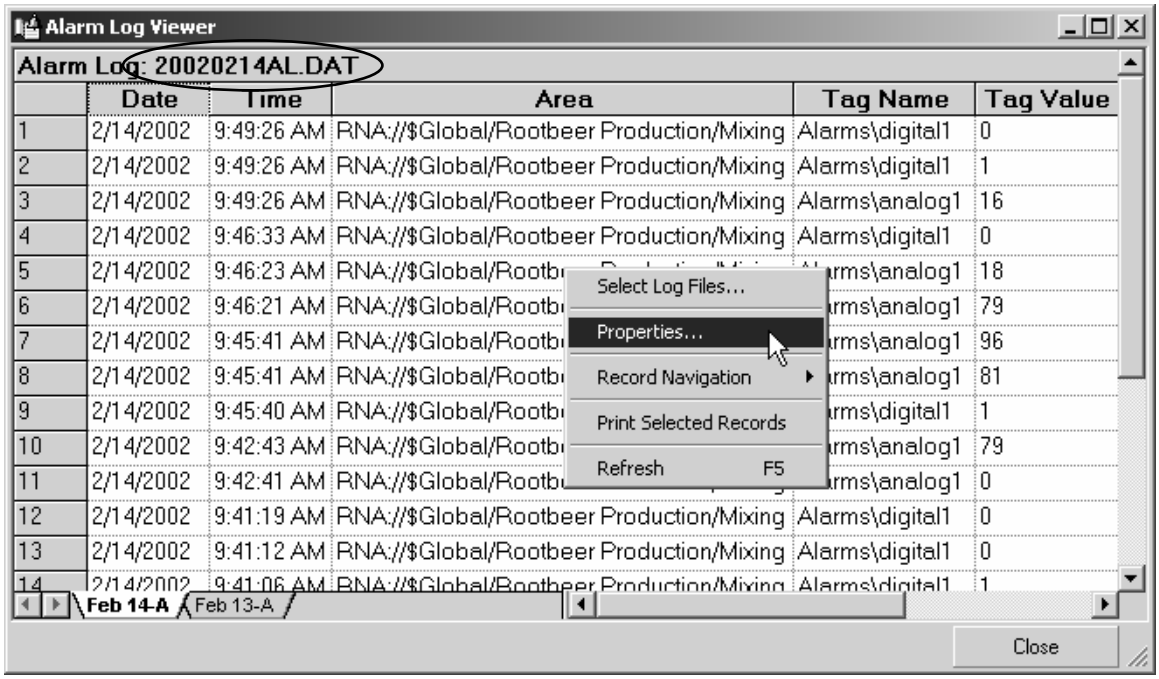


Click on the graphic outside of the alarm summary to exit editing and return to the graphic editor. Double-click the alarm summary to return to edit mode.

The Alarm Log Viewer

The alarm summary object will display current alarm information. Use the Alarm Log Viewer to see historical information. The Alarm Log Viewer shows the historical alarm log files that are local to an HMI Server.

Select **Alarm Log Viewer** from the **Tools** menu.


Alarm Log Viewer
Alarm Log: 20020214AL.DAT
Date
Time
Area
Tag Name
Tag Value
1 2/14/2002 9:49:26 AM RNA://$Global/Rootbeer Production/Mixing Alarms\digital1 0
2 2/14/2002 9:49:26 AM RNA://$Global/Rootbeer Production/Mixing Alarms\digital1 1
3 2/14/2002 9:49:26 AM RNA://$Global/Rootbeer Production/Mixing Alarms\analog1 16
4 2/14/2002 9:46:33 AM RNA://$Global/Rootbeer Production/Mixing Alarms\digital1 0
5 2/14/2002 9:46:23 AM RNA://$Global/Rootb rms\analog1 18
6 2/14/2002 9:46:21 AM RNA://$Global/Rootb rms\analog1 79
7 2/14/2002 9:45:41 AM RNA://$Global/Rootb rms\analog1 96
8 2/14/2002 9:45:41 AM RNA://$Global/Rootb rms\analog1 81
9 2/14/2002 9:45:40 AM RNA://$Global/Rootb rms\digital1 1
10 2/14/2002 9:42:43 AM RNA://$Global/Rootb rms\analog1 79
11 2/14/2002 9:42:41 AM RNA://$Global/Rootb rms\analog1 0
12 2/14/2002 9:41:19 AM RNA://$Global/Rootbeer Production/Mixing Alarms\digital1 0
13 2/14/2002 9:41:12 AM RNA://$Global/Rootbeer Production/Mixing Alarms\digital1 0
14 2/14/2002 9:41:06 AM RNA://$Global/Rootbeer Production/Mixing Alarms\digital1 1
Select Log Files...
Properties...
Record Navigation
Print Selected Records
Refresh F5
Feb 14-A
Feb 13-A
Close

You will be shown the current alarm log file, as defined in the Alarm Log Setup. The name of the file is in the top left corner.

Right-click in the window to change the alarm log viewer.

- Select Log Files – this will present you with a dialog box to select an alarm log file
- Properties – use this to customize the Viewer. Change:
  - How many files are shown, and from which computer
  - Which columns are shown
  - Text fonts
  - Row colors
- Record Navigation – move within the current alarm log file
- Print the records
- Refresh the Viewer

Use the `AppStart` command to open the Alarm Log Viewer from within RSView:

```
AppStart "C:\Program Files\Rockwell Software\RSView
Enterprise\AlarmLogViewer.exe"
```

Suppressing Alarms

You can suppress alarm monitoring for one or more tags. This is useful for testing the system or performing repairs or maintenance on a piece of equipment. You can view a list of the tags not being monitored using the Suppressed List. You can also turn monitoring back on from this list.

To suppress alarm monitoring for a tag, issue this command

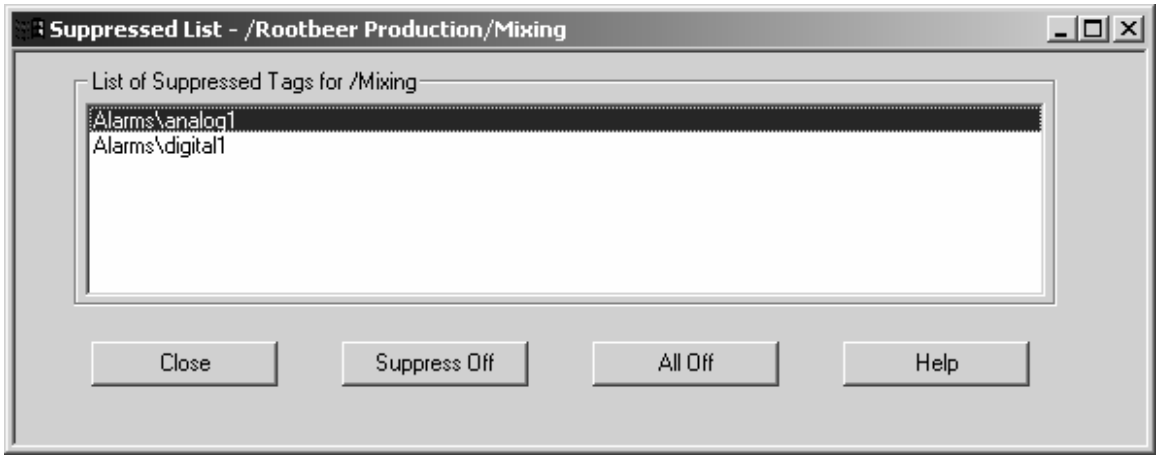
```
SuppressOn <tag name>
```

To suppress more than one tag, you may use wildcards:

* - matches any number of characters, including the backslash (\) and period (.) characters.
? - matches any single character.

```
SuppressOn <Line1\*>
```

To view the list of alarms with suppression turned on, double-click the Suppressed List icon in the Alarms folder in the Application Explorer.



To turn suppression off from the Suppressed List

- Select a tag name then click the Suppress Off button.
- Click Suppress Off All to turn suppression off for all tags.

Note You can also turn suppression off from the command line using the `SuppressOff` or `SuppressOffAll` command in the same way you use the `SuppressOn` command.

Lab 8 – Configuring Alarms

Objective: In this lab, you will configure the entire RSView alarm system. This includes:

- creating tags and applying alarming to them.
- configuring the Alarm Setup editor
- configuring the Alarm Log Setup editor
- configuring an Alarm Summary object in a graphic display

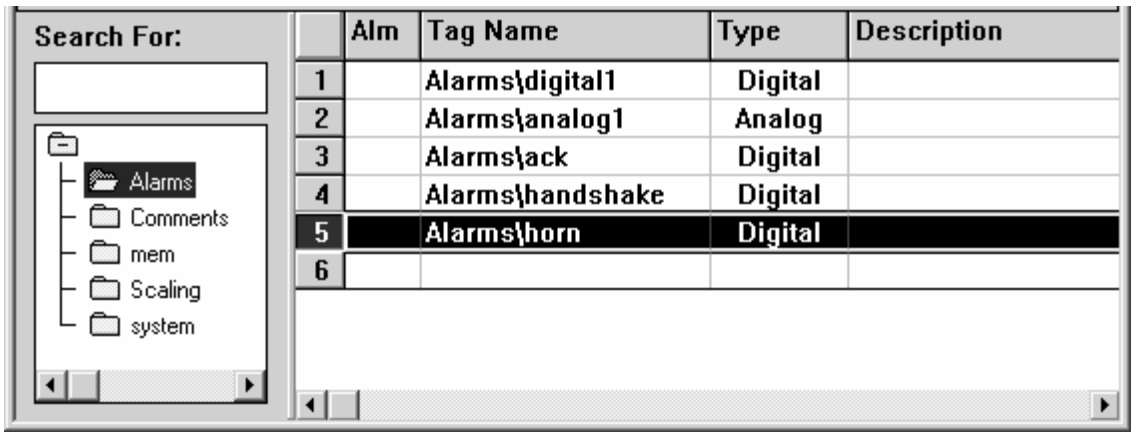
Software Requirements:

- RSView Studio
- SoftLogix 5860 running RSView_Class_SoftLogix program

1. Create HMI Alarm Tags.

RSView Alarms are configured on HMI Tags. Create these tags first.

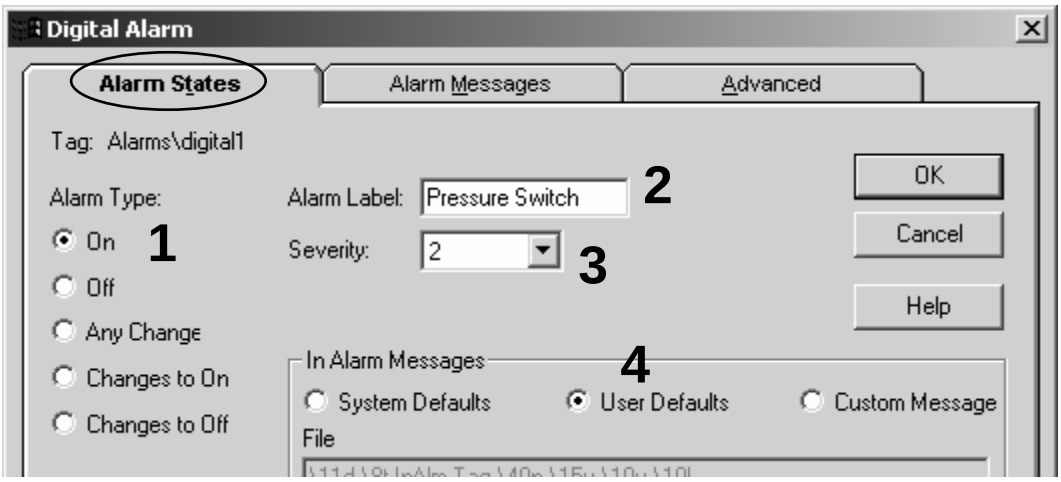
- Open the Tag Database Editor
- Create a folder called **Alarms**
- Create the following 5 tags. Accept all the defaults, and use **memory** as the data source



2. Configure alarms on HMI Tags

- Select the **Alarms\digital1** tag, and check the Alarms box.

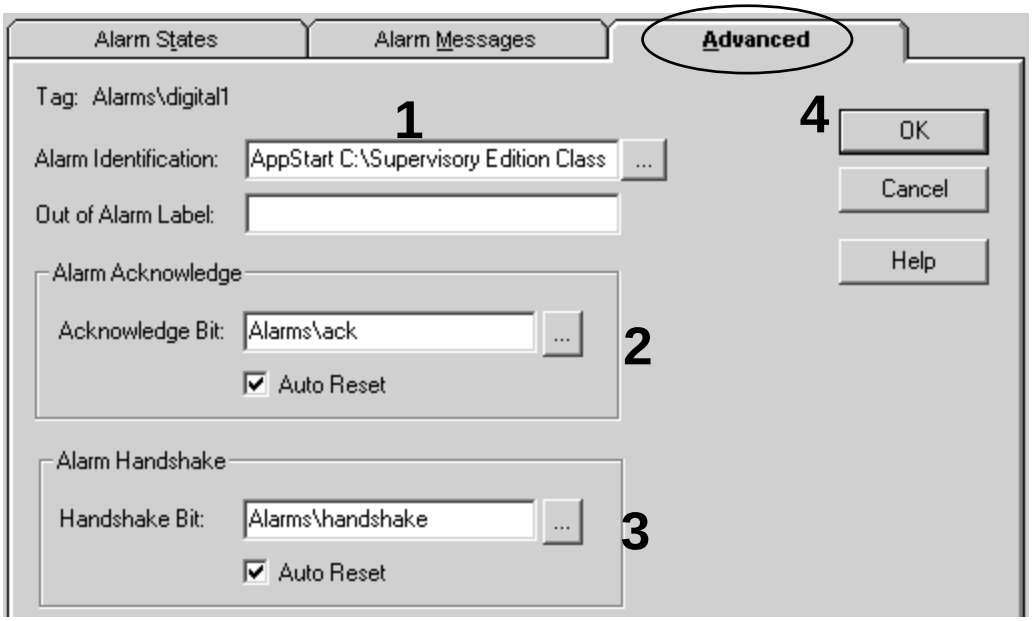
- The alarm configuration dialog box will open.



Configure this alarm:

1. **On** type
2. Type a label of your choice. Use your area name.
3. Severity 2
4. Choose U**ser Default** In Alarm message

- Click on the **Advanced tab**



1. Type the command:

```
Appstart C:\supervisory edition class files\alarminfo.htm
```

   in the Alarm Identification field. This will show a web page when the operator clicks on the **Identify** button with this alarm selected in the alarm summary

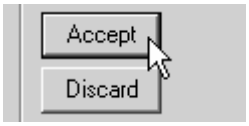
   Note: The command wizard for appstart will only browse for .exe files. The path for the web page must be typed. Do not use quotes in the command.

2. Browse for **Alarms\ack** as the acknowledge bit

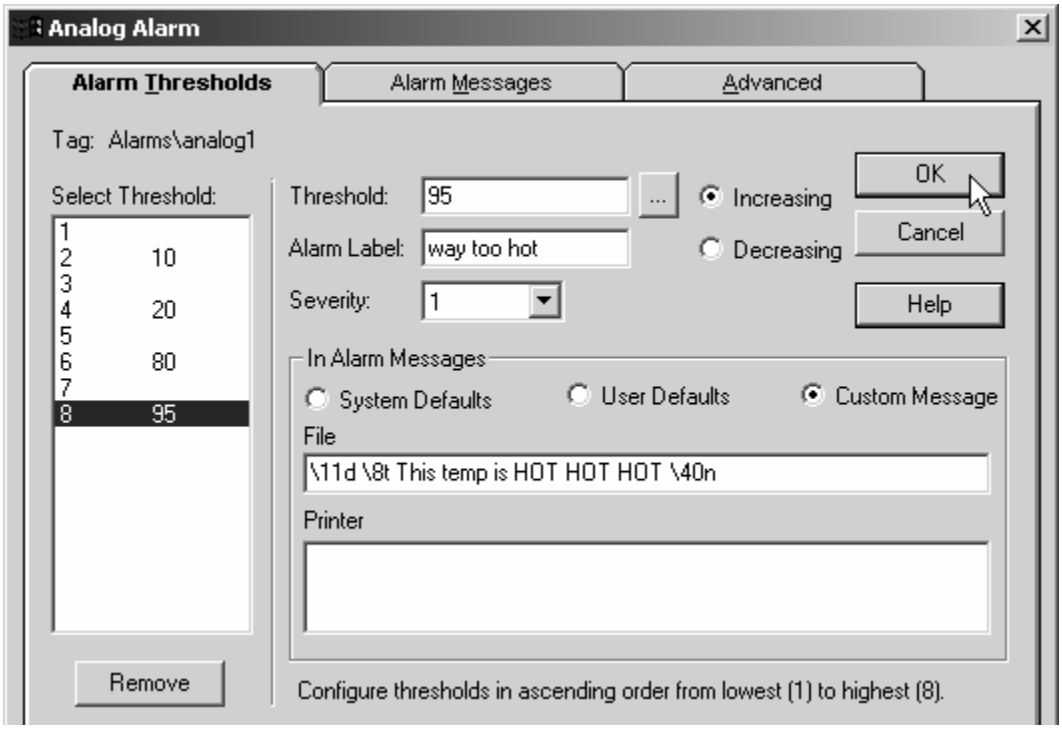
3. Browse for **Alarms\handshake** as the handshake bit

4. Click **OK** to exit the dialog.

Click **Accept** in the tag database editor to accept these edits.



- Select the **Alarms\analog1** tag in the tag database. Click the Alarms checkbox and configure it.



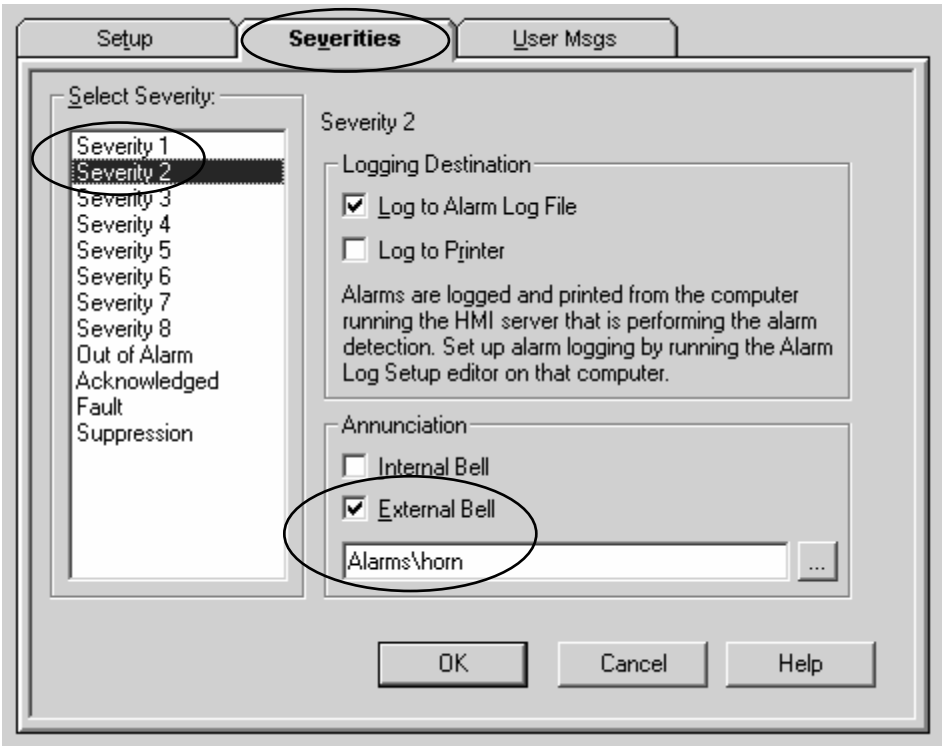
Threshold 2	**Threshold 4**	**Threshold 6**	**Threshold 8**
Threshold = 10	Threshold = 20	Threshold = 80	Threshold = 95
Decreasing	Decreasing	Increasing	Increasing
Label - **way too cold**	Label - **too cold**	Label - **too hot**	Label - **way too hot**
Severity 1	Severity 3	Severity 3	Severity 1
System default message	System default message	System default message	Custom message (see picture, or make one up) Click **OK** and **Accept** these edits.

- Click **OK** to close the editor. Accept the tag edits. Close the Tag Database editor.

3. Configure the Alarm Setup Editor

Configure alarming so an external bit (signifying a horn, stacklight etc…) will be set.

- Open the Alarm Setup editor from the Alarms folder in your HMI Project
- Click on the **Severities** tab. Select the external bell, and browse for **Alarms\horn**. Do this for both **Severity 1** and **Severity 2**



- Click on the **User Msgs** tab. Change the In Alarm File message to a message of your choosing.

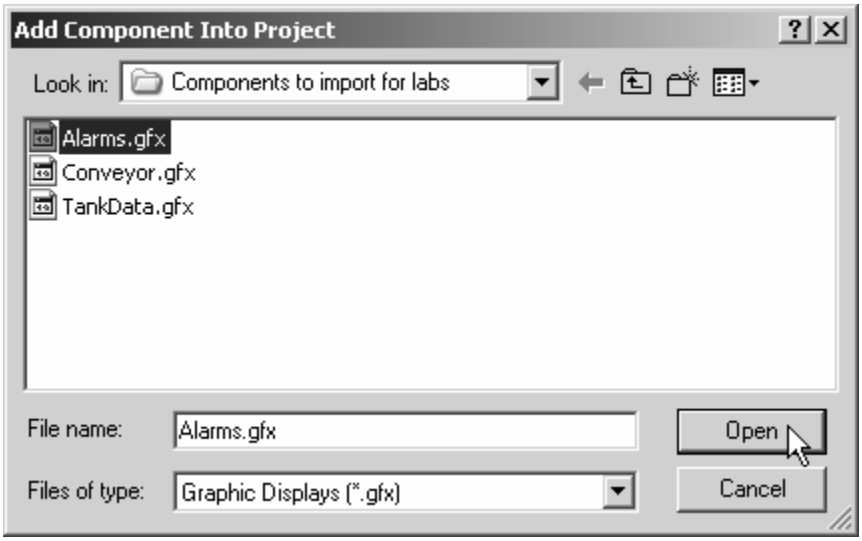
Setup
Severities
User Msgs
In Alarm File and Printer Messages
My User message on \11d \8t InAlm Tag \40n
\11d \8t InAlm Tag \40n \15v \10u \10l

- Click **OK** to exit the window.

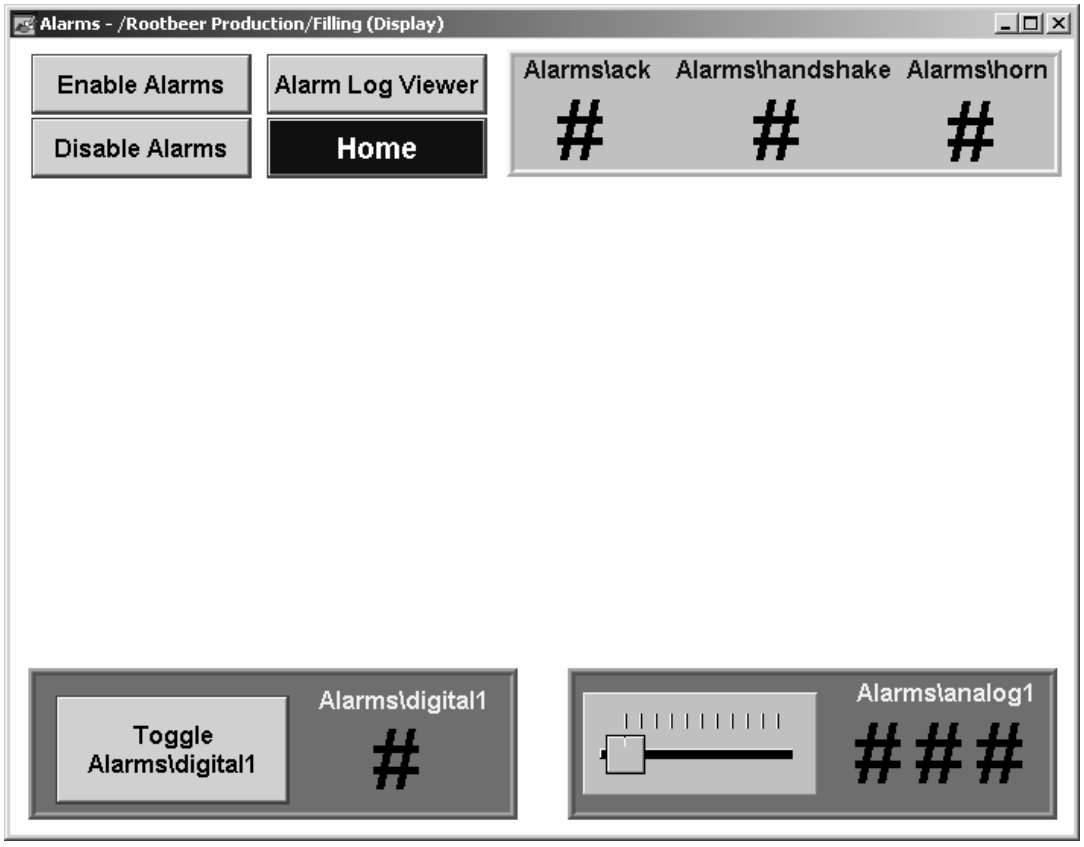
4. Configure the Operator Interface

An operator will view and acknowledge alarms from an Alarm Summary object in a graphic display.

- Import the **Alarms** graphic display from the **Components to import for labs** folder into your HMI graphic displays:

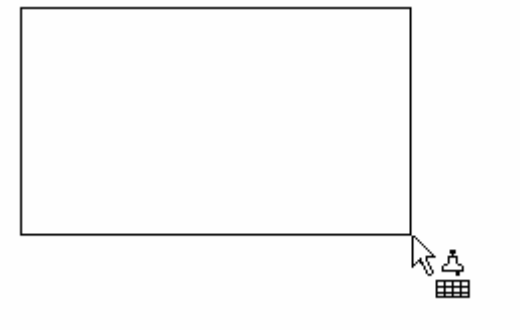


Open the graphic:

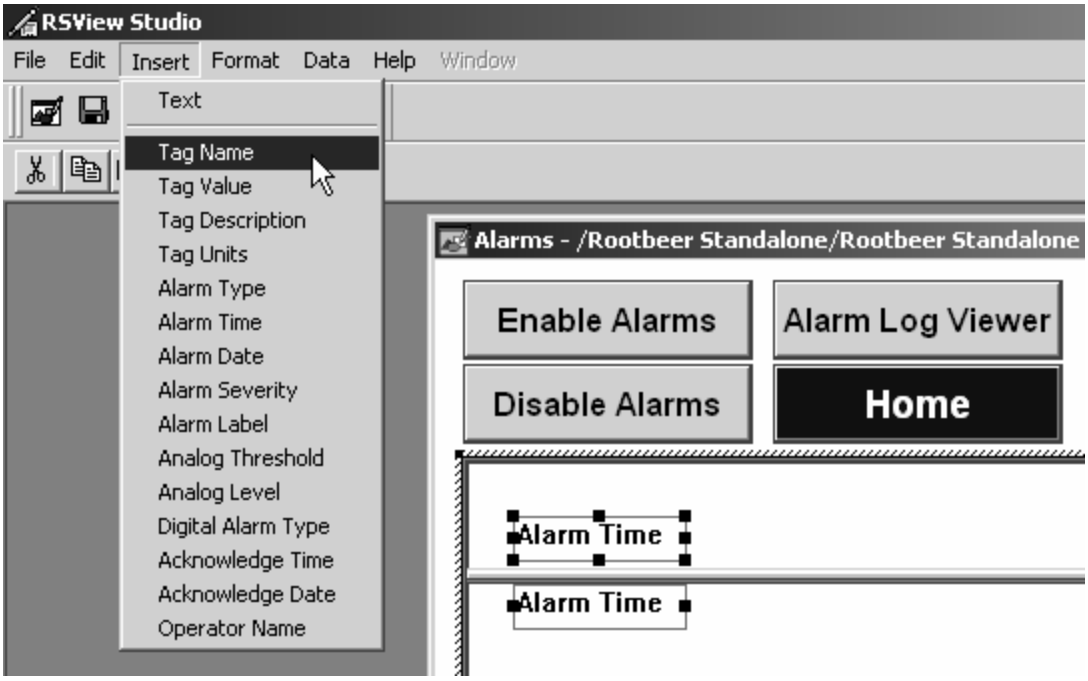


The graphic is set up to use the Alarm tags you created earlier.

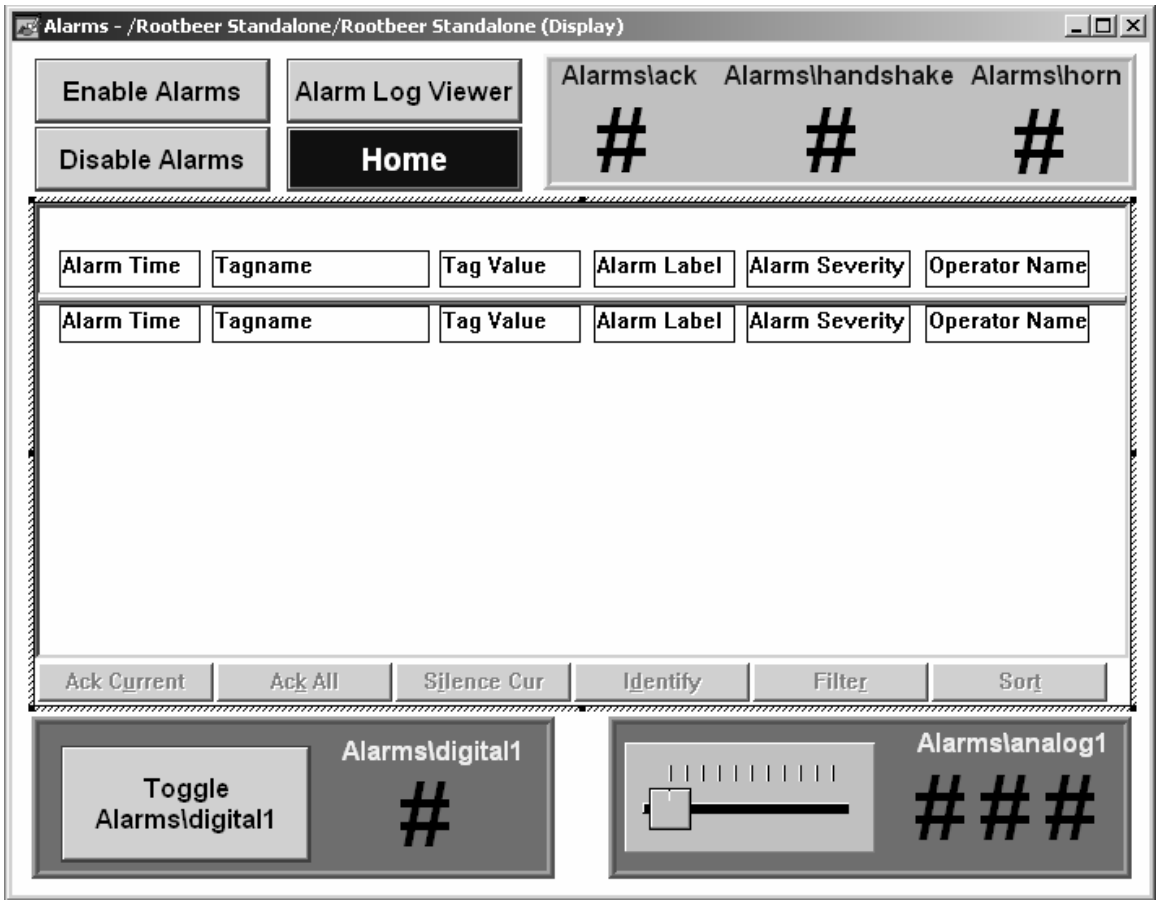
Create an Alarm Summary object by selecting the tool and dragging a rectangle in the white space of the Alarms graphic.



The Alarm Summary is in Edit Mode when you release the left mouse button. Use the Insert menu to build the Alarm Summary.



The finished Alarm Summary should have the following fields inserted:



Show only the following buttons in the alarm summary:

- Ack Current
- Ack All
- Silence Current
- Identify
- Filter
- Sort

Save and close the graphic display.

This alarm summary will be the operator interface for viewing and acknowledging alarms generated in the project.

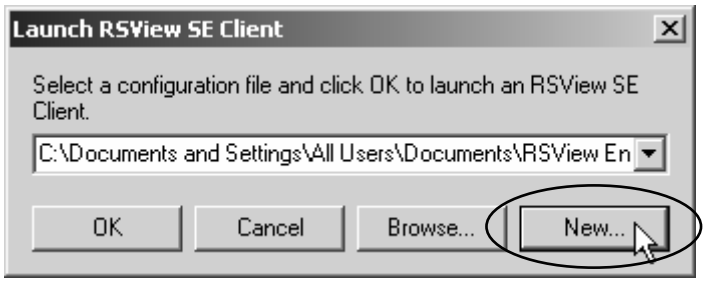
5. Testing the Alarm System

Testing the display will not activate the alarm summary. An SE Client must be configured to test the alarming functionality.

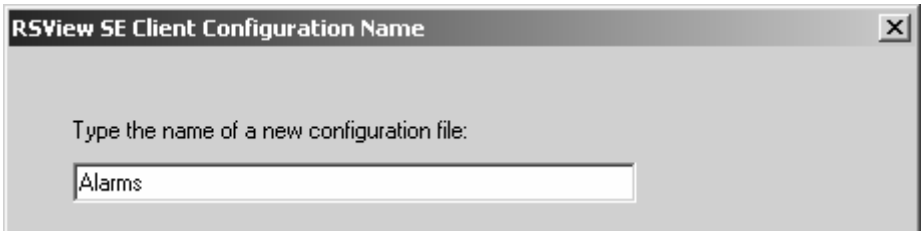
SE Client is the runtime operator interface. A 2 hour test client is included with RSView Studio.

The steps for creating a client to test the tag placeholders are detailed below.

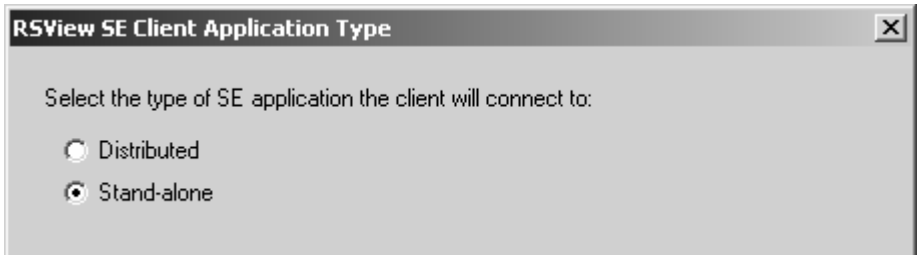
- Select **Launch Display Client** from the **Tools** menu.
- Click **New**



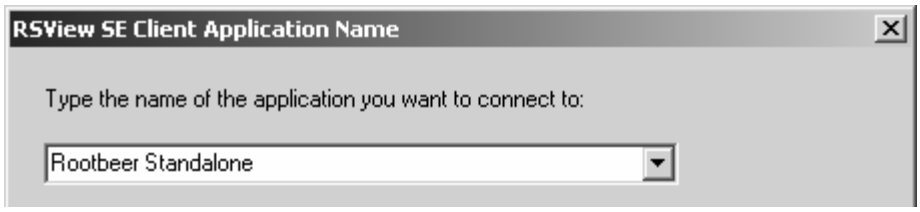
- Click **New** again in the RSView SE Client Wizard
- Type **Alarms** as the name of the client file. Keep the default location. Click **Next**.



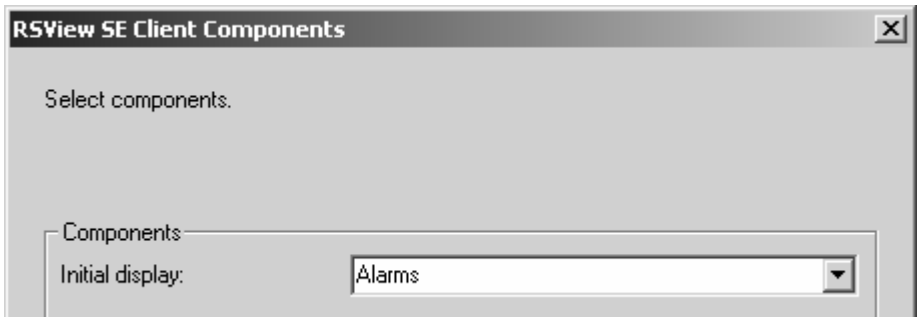
- Select the Stand-alone option. Click **Next**.


RSView SE Client Application Type
Select the type of SE application the client will connect to:
Distributed
Stand-alone

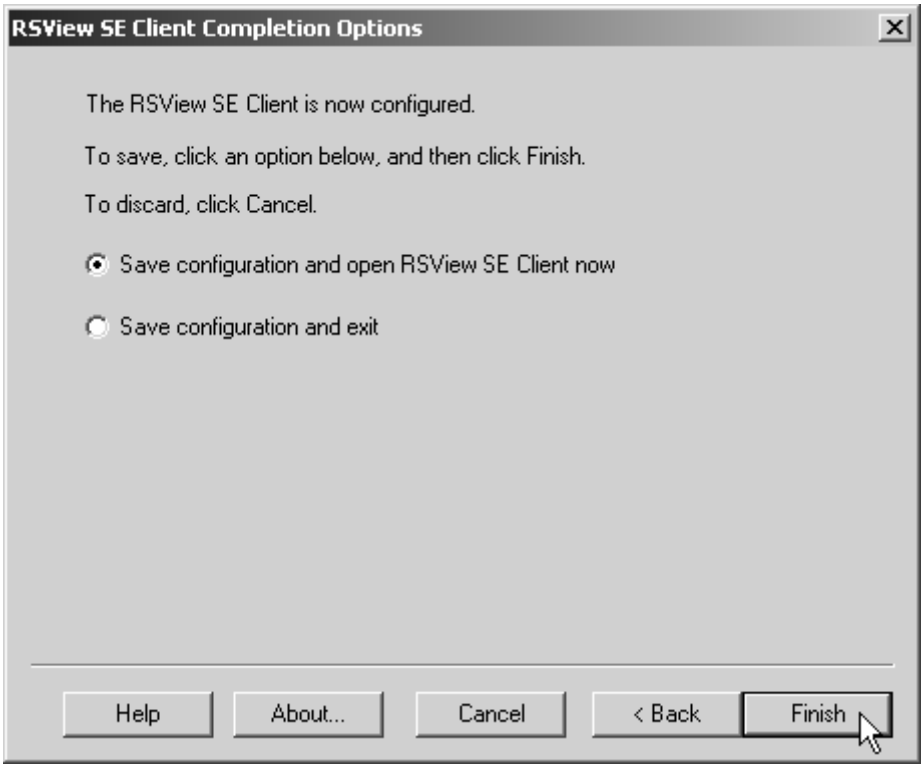
- Select your application. Click **Next**.



- Select the **Alarms** graphic as the initial display. Click **Next**.

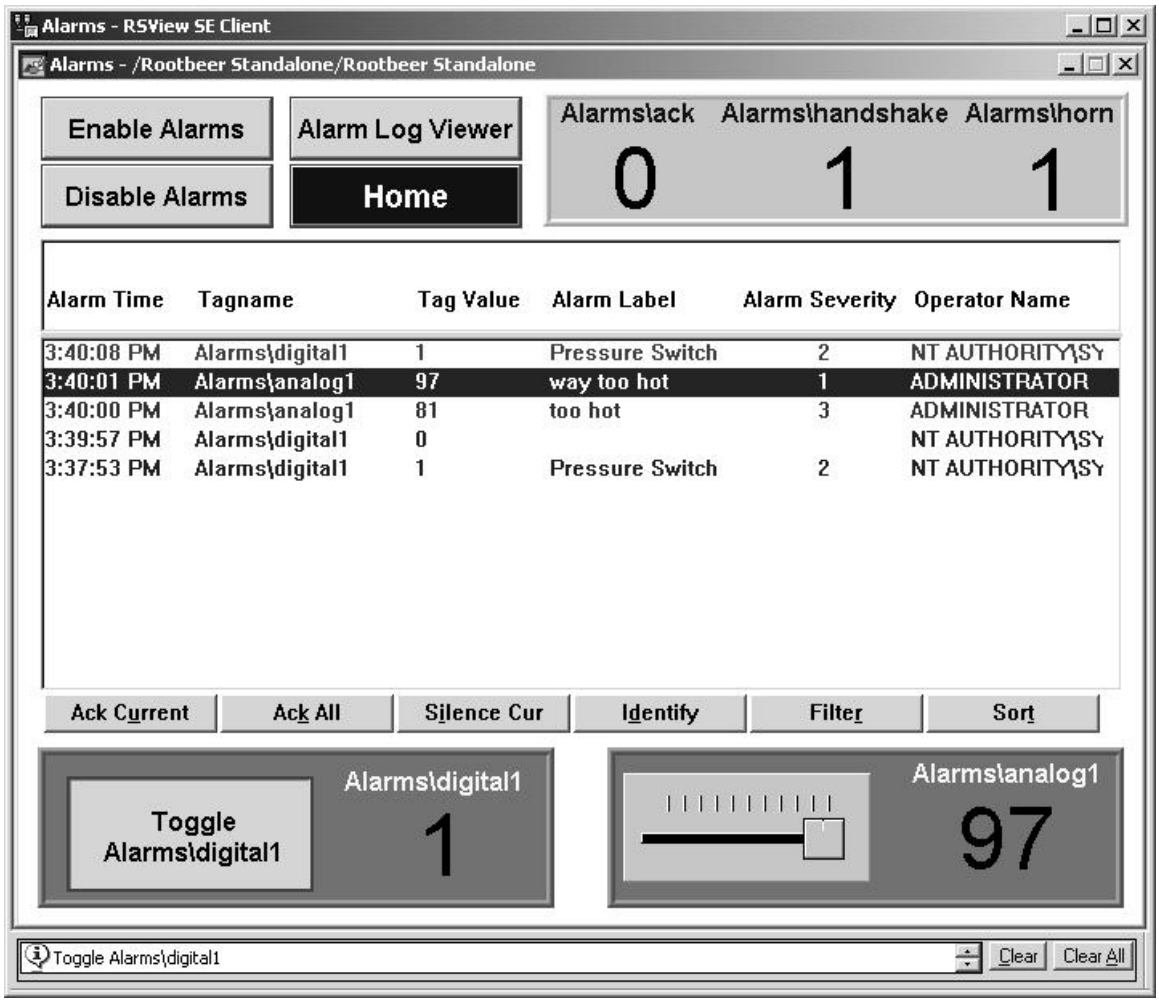


- Accept the defaults for the next two dialog boxes. Click **Finish** to save the settings and open the client file.


RSView SE Client Completion Options
The RSView SE Client is now configured.
To save, click an option below, and then click Finish.
To discard, click Cancel.
Save configuration and open RSView SE Client now
Save configuration and exit
Help
About...
Cancel
< Back
Finish

Test the Alarm System

- Click the **Enable Alarms** button to activate the alarm system.



- Generate alarms by changing the values of the digital and analog tags at the bottom of the screen.
- Acknowledge and Silence alarms. What happens to the entries in the Alarm Summary? How are the handshaking, acknowledgment and horn bits changed?
- Select the **Alarms\digital1** tag when it is in alarm. Click the **Identify** button. What happens? Why?
- Click the **Alarm Log Viewer** button to open a historical log of all alarms.
- Close the Alarm client when you are done troubleshooting alarms.

This Lab is Finished.

7. Diagnostics Logging

Objectives:

- Define the function and scope of FactoryTalk Diagnostics
- Configure FactoryTalk Diagnostics Logging.
- Use the FactoryTalk Diagnostics Viewer

FactoryTalk Diagnostics

The idea behind FactoryTalk™ Diagnostics is to answer the question, "Why did that happen?" FactoryTalk Diagnostics collects and provides access to a global store of time-and date-stamped error and warning messages, activity and status messages, informational messages, and other diagnostic messages that can help answer that fundamental question.

The purpose of FactoryTalk Diagnostics is to help you diagnose trouble spots while operating and maintaining an automation solution made up of multiple distributed products and services.

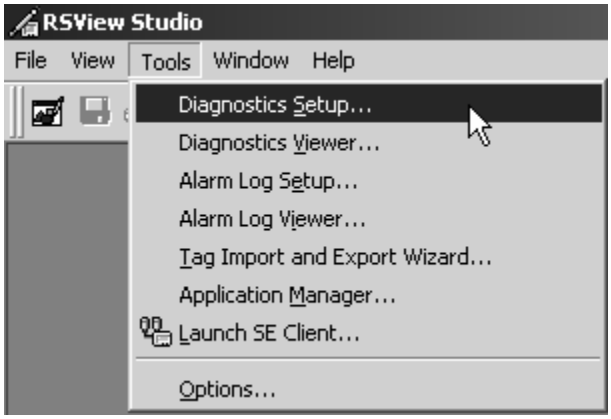
FactoryTalk Diagnostics allows you to collect, store, and examine messages from multiple Factory Talk-enabled products (including the RSView Supervisory Edition components) in a single, central location on each computer where the service is installed. In addition to logging and viewing local messages, you can also view messages retrieved and merged from multiple products running on multiple computers logging to multiple destinations.

FactoryTalk Diagnostics replaces the Activity Logging from previous versions of RSView.

FactoryTalk Diagnostics Logging

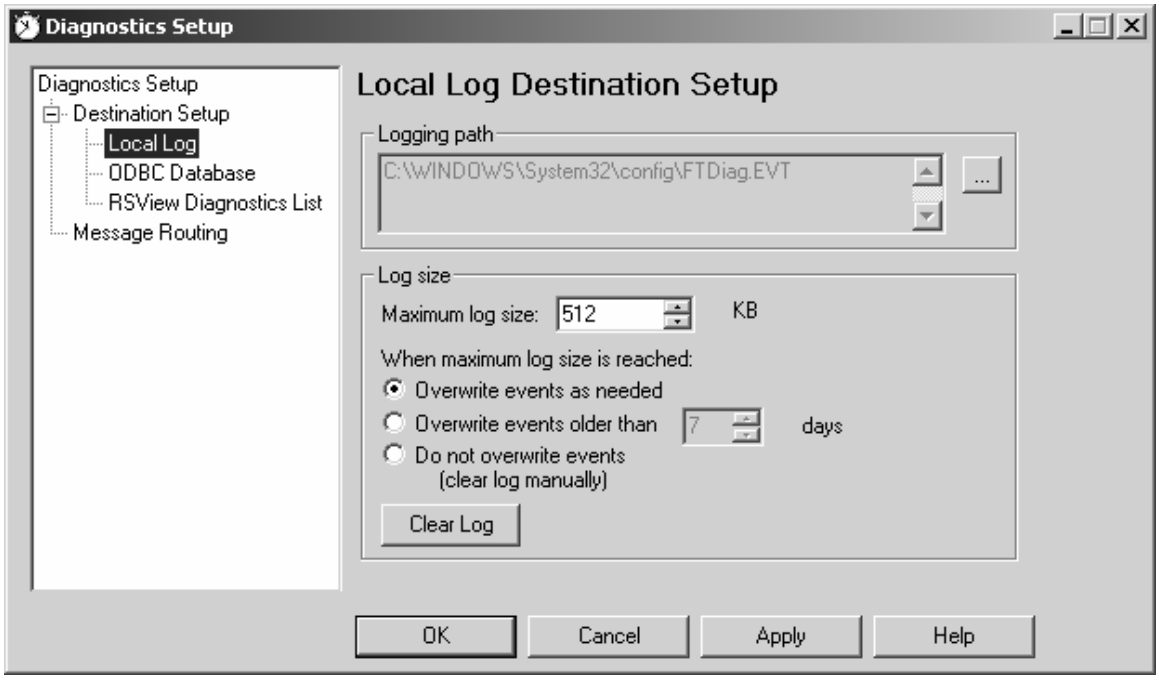
Configure FactoryTalk Diagnostics Logging with the **Diagnostics Setup** editor in the **Tools** menu of RSView Studio.

This is a separate application that may be opened from the Start, Programs, Rockwell Software, Utilities menu.

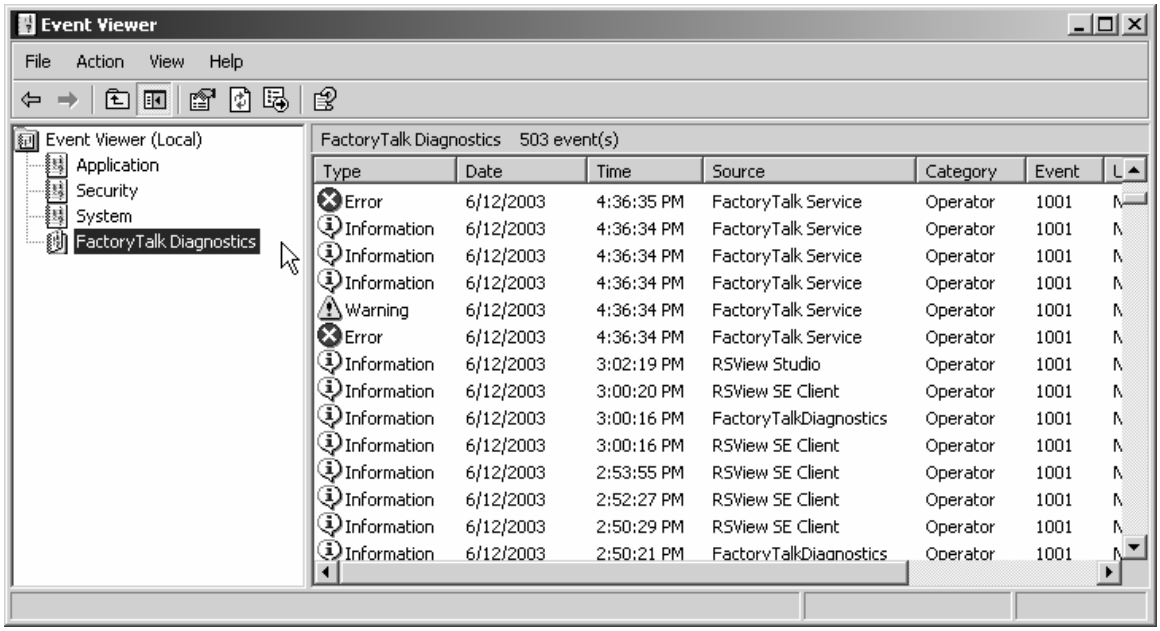


The Local Log

Diagnostics Messages are sent to a local log on every computer that has a FactoryTalk-enabled product.



The local FactoryTalk Diagnostics log is grouped with other Windows Event files. Open the Windows Event Viewer from the Control Panel, Administrative Tools.

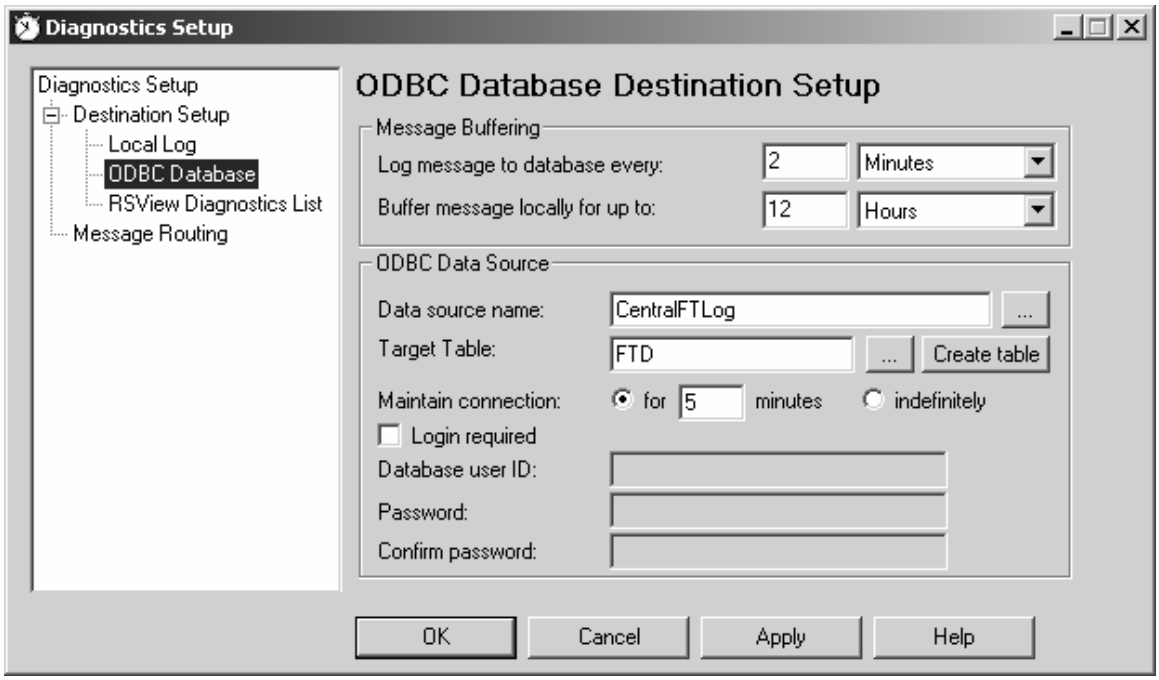

Event Viewer
File Action View Help
Event Viewer (Local)
Application
Security
System
FactoryTalk Diagnostics
FactoryTalk Diagnostics 503 event(s)
Type Date Time Source Category Event
Error 6/12/2003 4:36:35 PM FactoryTalk Service Operator 1001
Information 6/12/2003 4:36:34 PM FactoryTalk Service Operator 1001
Information 6/12/2003 4:36:34 PM FactoryTalk Service Operator 1001
Information 6/12/2003 4:36:34 PM FactoryTalk Service Operator 1001
Warning 6/12/2003 4:36:34 PM FactoryTalk Service Operator 1001
Error 6/12/2003 4:36:34 PM FactoryTalk Service Operator 1001
Information 6/12/2003 3:02:19 PM RSView Studio Operator 1001
Information 6/12/2003 3:00:20 PM RSView SE Client Operator 1001
Information 6/12/2003 3:00:16 PM FactoryTalkDiagnostics Operator 1001
Information 6/12/2003 3:00:16 PM RSView SE Client Operator 1001
Information 6/12/2003 2:53:55 PM RSView SE Client Operator 1001
Information 6/12/2003 2:52:27 PM RSView SE Client Operator 1001
Information 6/12/2003 2:50:29 PM RSView SE Client Operator 1001
Information 6/12/2003 2:50:21 PM FactoryTalkDiagnostics Operator 1001

ODBC Logging

The local FactoryTalk Diagnostics log may be exported to an ODBC Database.

The ODBC Database destination supports these ODBC-compliant databases:

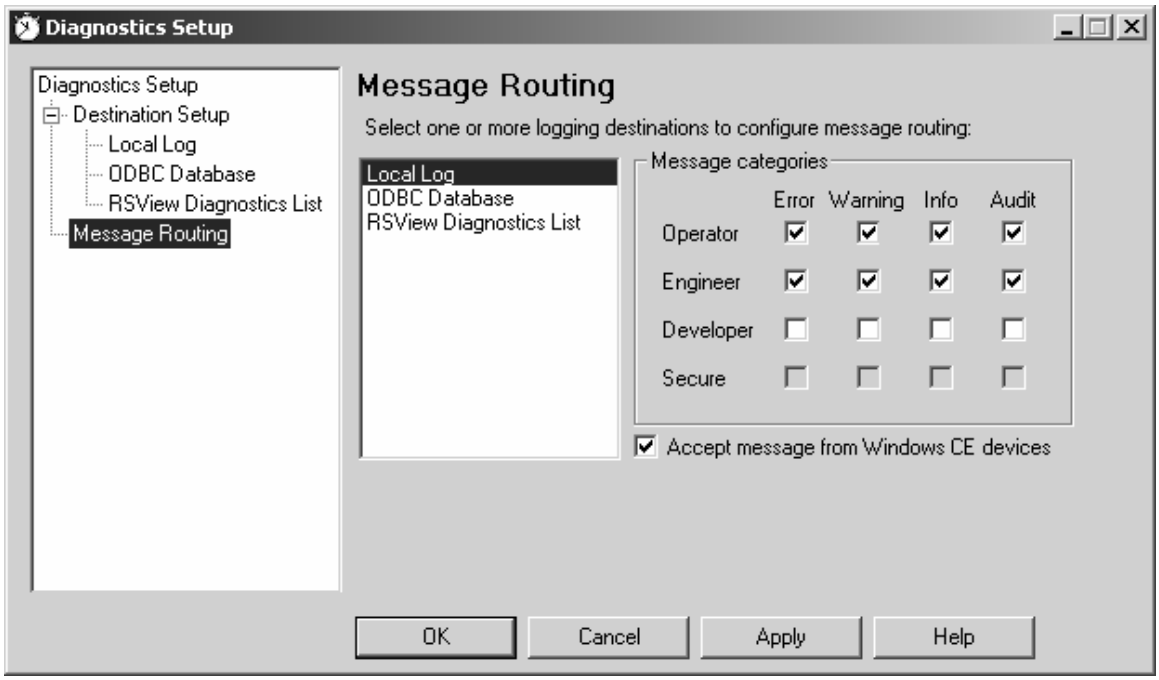
- Microsoft Access
- Microsoft SQL Server
- Oracle
- Sybase SQL Server



Message Routing

Use the Message Routing window to specify which categories of messages should be routed to each logging destination available on your computer. The options available to you are specific for each logging destination installed on your computer.

Each FactoryTalk-enabled product categorizes the messages that it generates using a matrix of Severity options (Error, Warning, Information, and Audit) together with Audience options (Operator, Engineer, Developer, and Secure). For example, a product might generate a series of security messages classified as Operator-Audit and Operator-Information, and also generate a series of communication messages classified as Operator-Warning, Engineer-Warning, and Developer-Error.



Message categories

The definitions below, with the exception of "Secure," are only suggestions. Each FactoryTalk-enabled product classifies its own set of messages and defines the meaning of the options to fit its own purposes.

Audience options

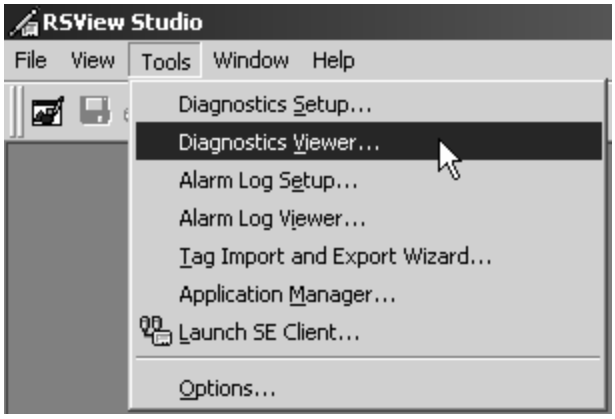
- **Operator** Typically, this option is assigned to "outcome" messages that confirm the success or failure of an action initiated by people who are operating or using the FactoryTalk-enabled product.
- **Engineer** Typically, this option is assigned to messages useful to control system designers, application engineers, and administrators for testing and troubleshooting FactoryTalk-enabled applications.
- **Developer** Typically, this option is assigned to messages useful to systems software developers for testing and troubleshooting software components and subsystems.
- **Secure** Reserved for messages which need to be protected and retained based on the U.S. government's 21CFR Part 11 specification for storing electronic records. Messages assigned this message type are logged to a logging destination provided by Rockwell Automation's RSMACC ™ software product.

Severity options

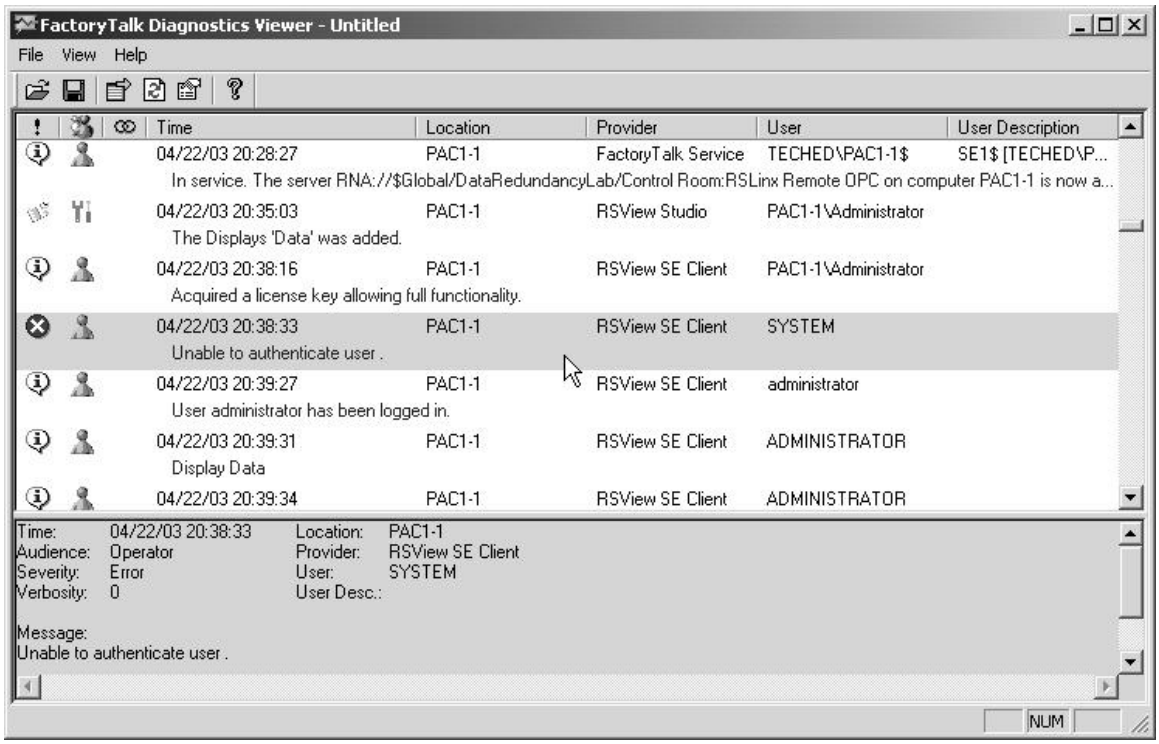
- **Error** Typically, this option is assigned to the most serious kind of error message that logs events triggered by significant problems.
- **Warning** Typically, this option is assigned to messages that are not necessarily significant but that may cause future problems.
- **Information** Typically, this option is assigned to messages that document the essential purpose of the FactoryTalk-enabled application, which supplement and add more detail to "Audit" messages.
- **Audit** Typically, this option is assigned to high-level "journal" type messages which indicate activities which are essential to the technology or application purpose.

The FactoryTalk Diagnostics Viewer

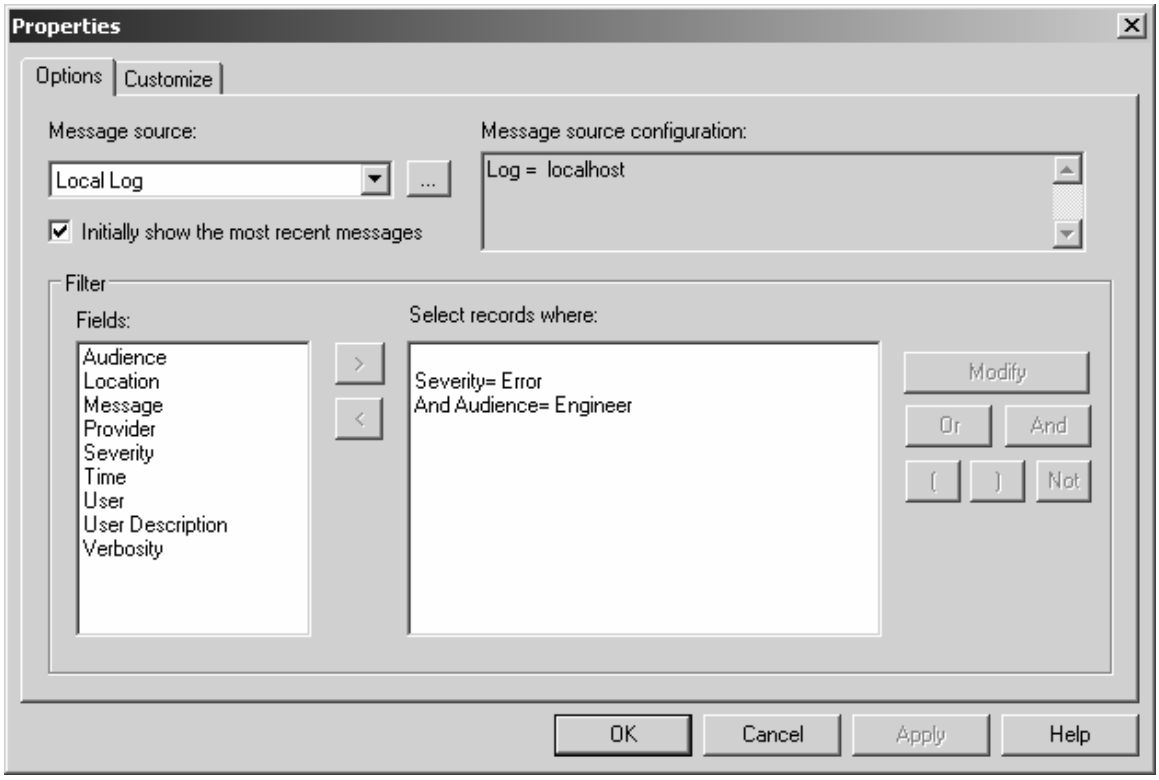
The FactoryTalk Diagnostics Viewer allows you to view both local messages and messages retrieved and merged from multiple products running on multiple computers logging to multiple destinations.



The Diagnostics Viewer reflects the messages as configured in the Setup.


FactoryTalk Diagnostics Viewer - Untitled
File View Help
Time Location Provider User User Description
04/22/03 20:28:27 PAC1-1 FactoryTalk Service TECHED\PAC1-1$ SE1$ [TECHED\P...
In service. The server RNA://$Global/DataRedundancyLab/Control Room:RSLinx Remote OPC on computer PAC1-1 is now a...
04/22/03 20:35:03 PAC1-1 RSView Studio PAC1-1\Administrator
The Displays 'Data' was added.
04/22/03 20:38:16 PAC1-1 RSView SE Client PAC1-1\Administrator
Acquired a license key allowing full functionality.
04/22/03 20:38:33 PAC1-1 RSView SE Client SYSTEM
Unable to authenticate user .
04/22/03 20:39:27 PAC1-1 RSView SE Client administrator
User administrator has been logged in.
04/22/03 20:39:31 PAC1-1 RSView SE Client ADMINISTRATOR
Display Data
04/22/03 20:39:34 PAC1-1 RSView SE Client ADMINISTRATOR
Time: 04/22/03 20:38:33 Location: PAC1-1
Audience: Operator Provider: RSView SE Client
Severity: Error User: SYSTEM
Verbosity: 0 User Desc.:
Message:
Unable to authenticate user .
NUM

You can filter and customize the Diagnostics Viewer by selecting **Options** from the **View** menu. For example, to show only Error messages directed to the Engineer audience:



Choose how you wish to see messages displayed, and which columns to show by clicking the **Customize** tab in the Properties window.

Custom FactoryTalk Diagnostics Viewer configurations may be saved as **.ftd** files.

Use the `AppStart` command to open the Diagnostics Log Viewer from within an SE Client:

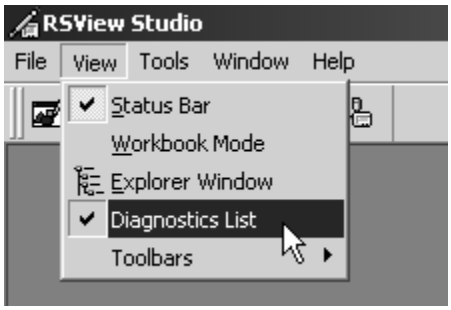
```
AppStart "C:\Program Files\Rockwell Software\RSView
Enterprise\ActivityLogViewer.exe"
```

The RSView Diagnostics List

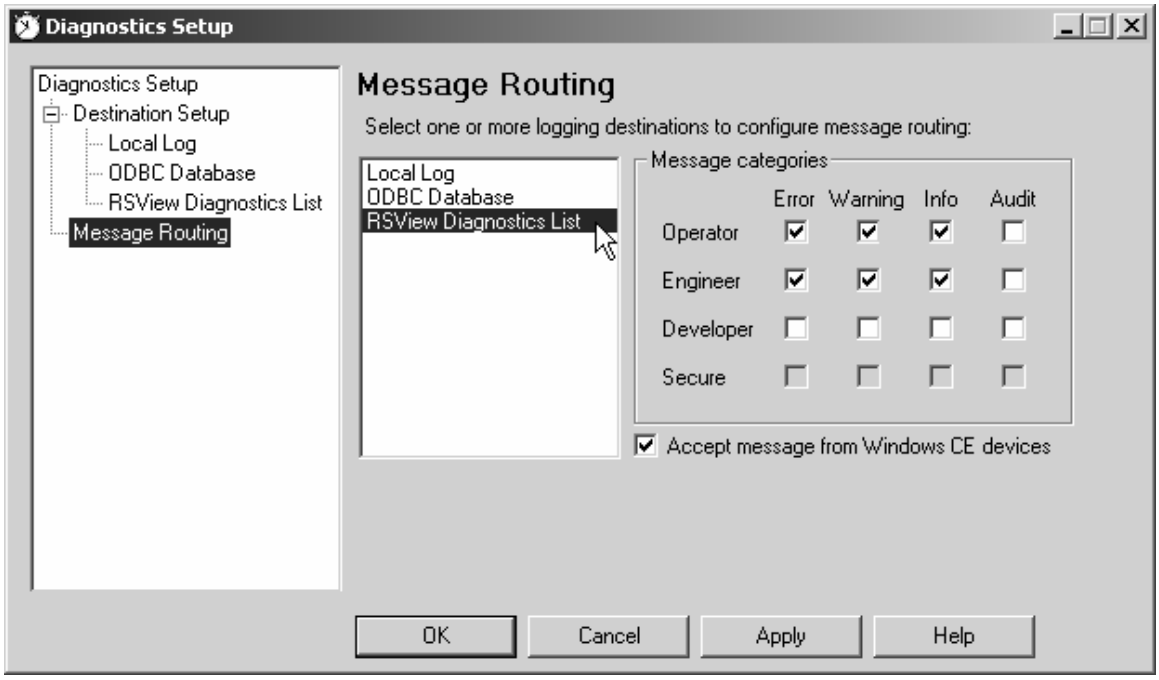
The Diagnostics List gives feedback while in development in RSView Studio, or during runtime with SE Client.

The Diagnostics List is located above the status bar in RSView Studio. You can undock (detach) the Diagnostics List and move it elsewhere in the RSView Studio window. To undock it, grab its drag bars in the bottom left-hand corner. Once it is undocked, you can resize it by dragging an edge or corner.

Show and hide the Diagnostics List from the **View** menu.



The information displayed in the Diagnostics List depends on how you have configured Diagnostics Setup.



There is no lab for this chapter. Experiment with FactoryTalk Diagnostics settings on your own.

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8. *Data Logging*

Objectives:

- Define the function of Data Logging
- Configure Data Log Models in RSView Studio
- Compare and configure the different storage formats for data logging
    - Data Log File Set
    - ODBC Database
- Use the Data Logging commands
- Start and Stop data logging

Data Logging in RSView

The tag database does not store actual tag values. Instead, it defines which values are to be collected. The values themselves are stored in a value table on a given HMI server. When the HMI server is turned off, the value table is cleared. To have a permanent record of tag values, log them to the data log file on disk.

To log tag values to disk, you create a data log model and specify the tags that are to be logged. This is done in the Data Log Models editor.

Data log information can be stored in two different formats

- file sets with the extension .DAT
- ODBC data source

If you use the File Set storage format, tag values are stored in proprietary-format files. You cannot view the contents of these file sets except with RSView trends.

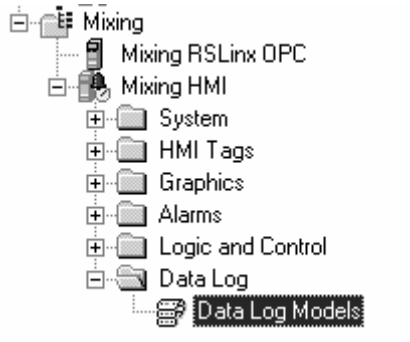
If you log to an ODBC database source, you can view the data in trends and use third-party, ODBC-compliant tools to analyze and create reports from the data.

Data Log Models

A data log model contains the details of how you want to log data

- Storage format
- Path of log file, backup path
- File management
- Auto-deletion of files or database records
- Logging Triggers – when to log tags
- Tags to log

Data log models are kept in the Data Log Model icon in the HMI project:



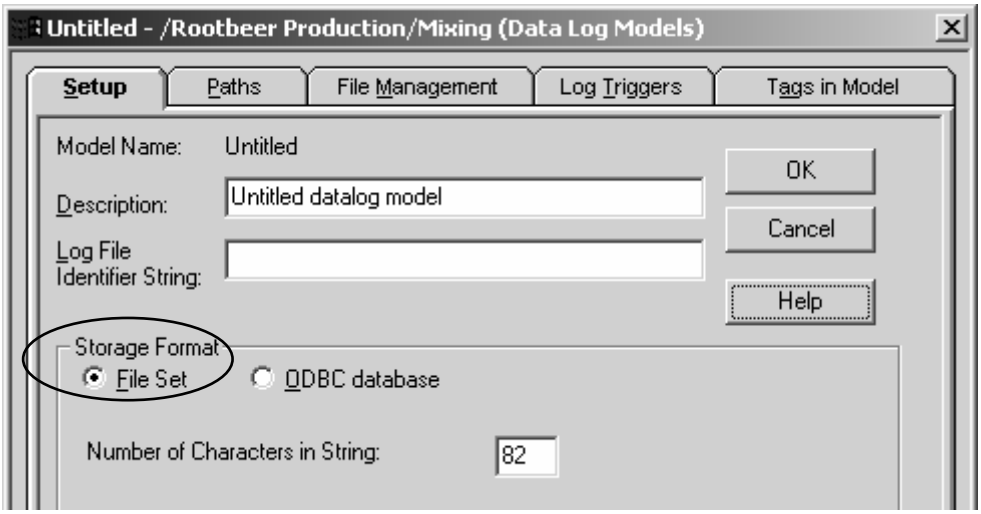
Create a new data log model by right-clicking on the data log model icon, or by the **File, New** menu.

- An HMI Server can have up to 20 data log models running at one time.
- The maximum number of tags that can be logged by one data log model is 10,000.
- The total number of characters and spaces allowed for the path and name of a tag in a data log model is 255.

Setup Tab

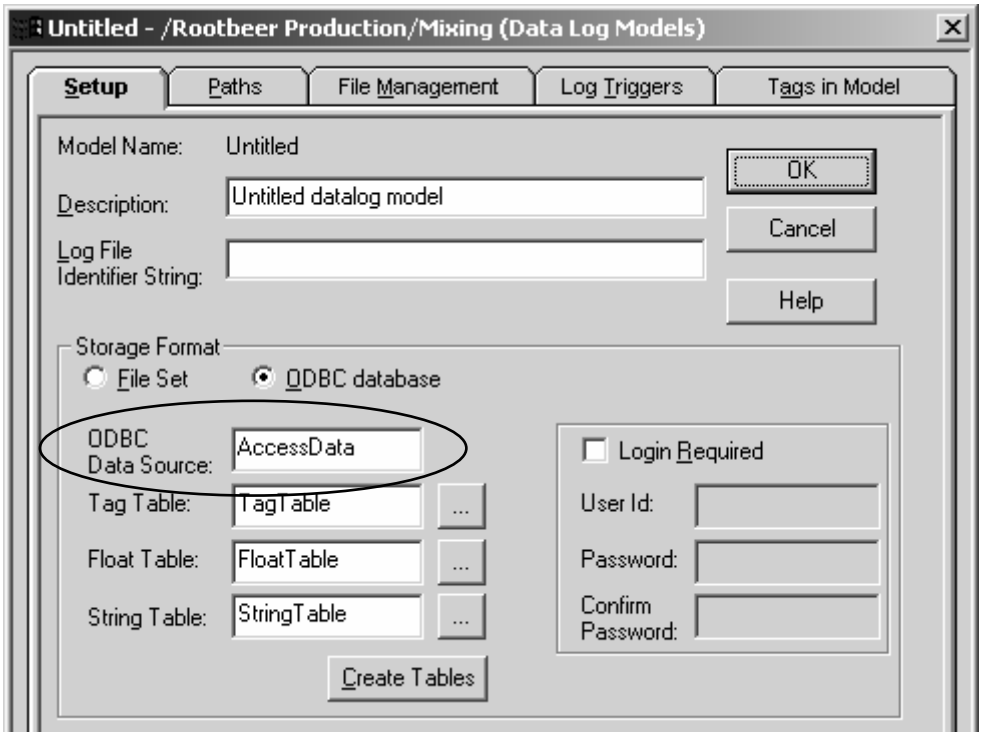
Select the data storage format here – File Set or ODBC.

File Set Logging:

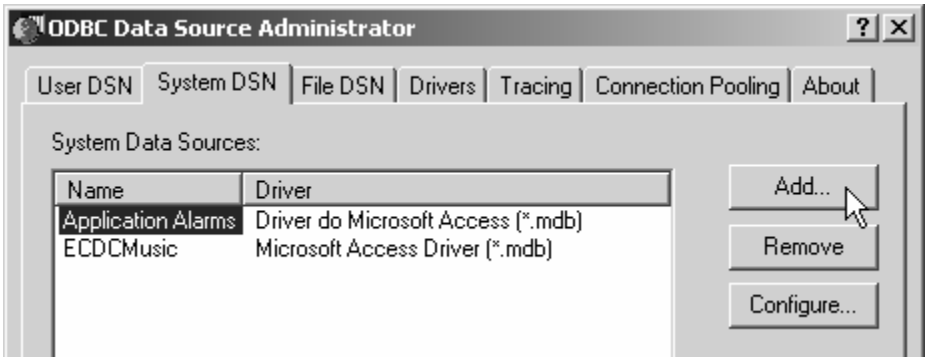


Specify the maximum number of characters in a string tag to be logged, up to 82.

ODBC Database logging



You must first create the data sources on the machine on which the data logger will run. To do this, use the Microsoft ODBC Data Source Administrator which you will find in **Start/Settings/Control Panel/Administrative Tools/Data Sources (ODBC).**



The ODBC data source cannot have the same name as the HMI project and must be either a System or File ODBC data source.

If you are logging to a remote ODBC database or file set (located on a different computer than the HMI server is on), you must change the security account the data log program runs under and the access permission for related logging services.

Data Logging to a Network Drive

If you are logging to a network drive that is not located on the same computer as the HMI server, you must change the security account under which the data log program file runs. To do this you must run the Windows tool for configuring DCOM. The user interface is slightly different between Windows 2000 and XP.

To start the DCOM configuration tool

1. On the computer on which you want to run a data log model, click the Windows Start button, and then click Run.
2. In the Open box, type dcomcnfg and then press Enter.

In Windows 2000 the Distributed COM Configuration Properties dialog box opens. In Windows XP the Component Services window opens.

If DCOM Configuration Warning messages appear, click No for each one.

To change the security account of the data log program file on Windows 2000

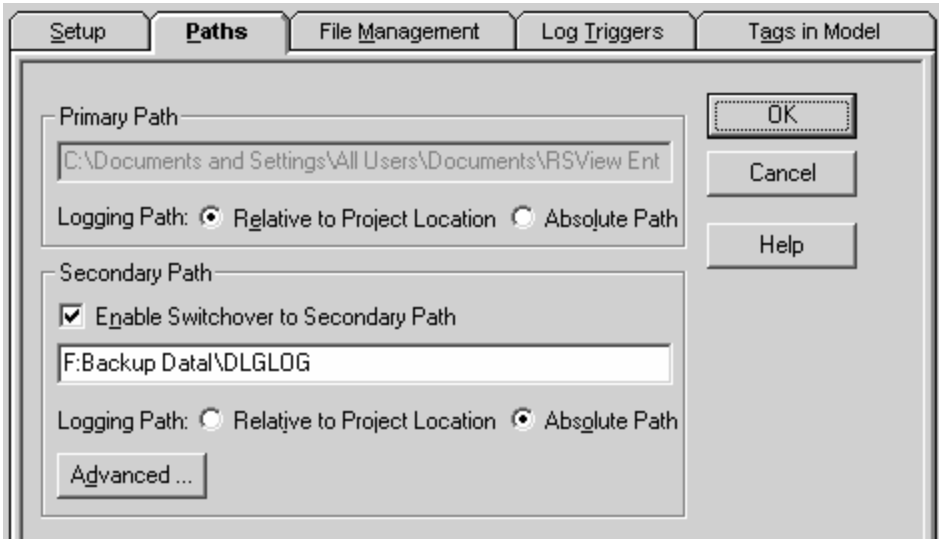
1. In the Distributed COM Configuration Properties dialog box, click the Applications tab.
2. In the Applications list, click DatalogServ and then click Properties.
3. In the DatalogServ Properties dialog box, click the Identity tab.
4. Click This User, and then type the name, password, and password confirmation for the user that will run the data log model.
5. Click OK.
6. Click OK again to close the Distributed Com Configuration Properties dialog.
7. Restart the computer so the configuration changes can take effect.

To change the security account of the data log program file on Windows XP

1. In the tree view (left-hand side) of the Component Services window, double-click Console Root if it is not expanded, and then navigate to Component Services\Computers\My Computer.
2. Click the DCOM Config folder to expand it.
3. Right-click DataLogServ to open the context menu and then select Properties.
4. In the DataLogServ Properties dialog box, click the Identity tab.
5. Click This User, and then type the name, password, and password confirmation for the user that will run the data log model.
6. Click OK.
7. Close the Component Services window and the restart the computer so the configuration changes can take effect.

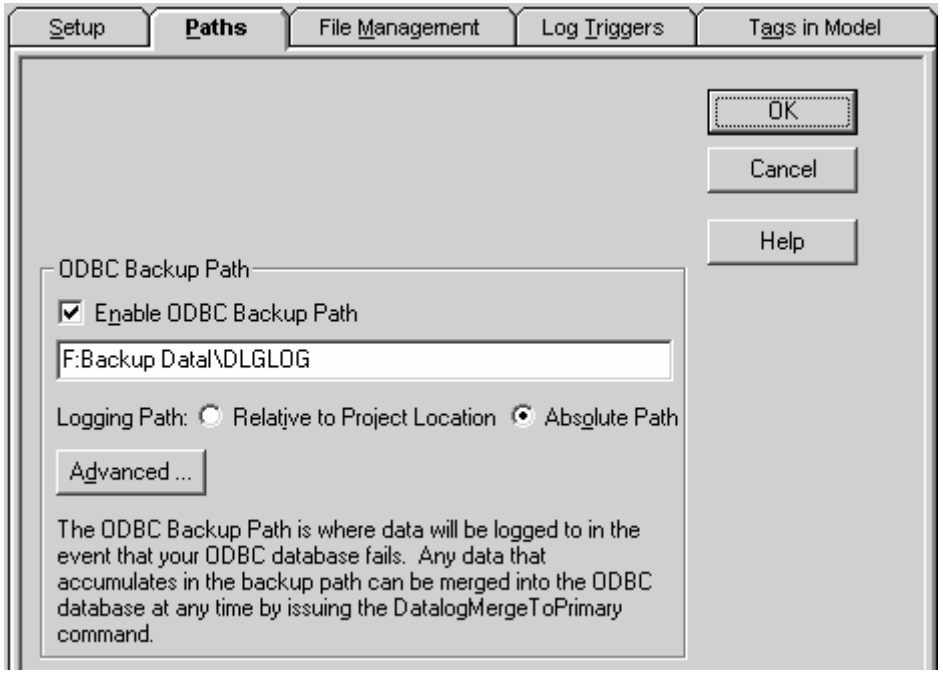
Paths Tab

File Set Logging:



Select where to store the file sets. A secondary path may be configured if the primary path is unavailable.

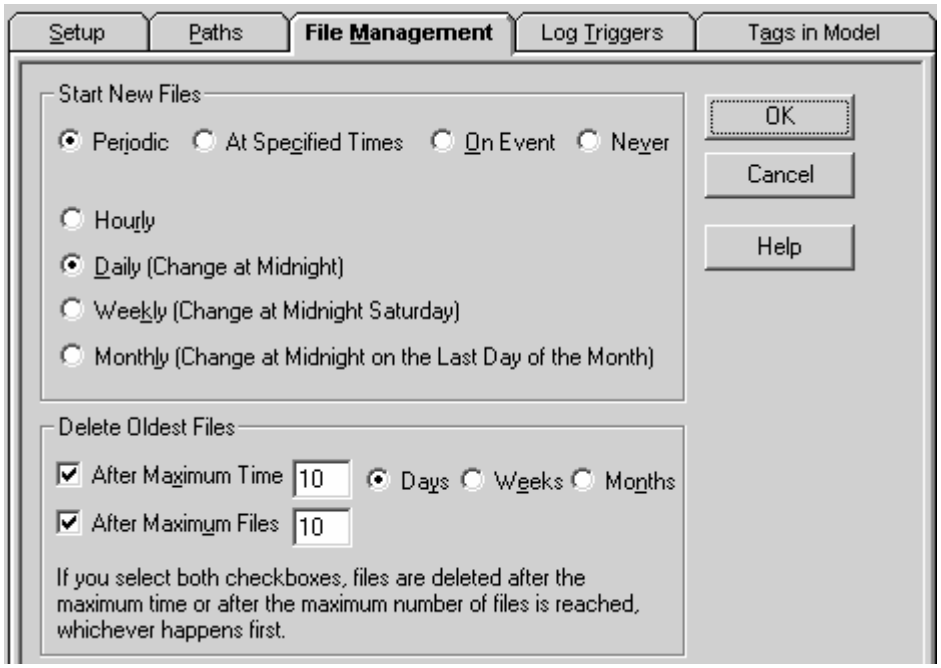
ODBC Logging:


Setup
Paths
File Management
Log Triggers
Tags in Model
OK
Cancel
Help
ODBC Backup Path
Enable ODBC Backup Path
F:Backup Datal\DLGLOG
Logging Path: Relative to Project Location Absolute Path
Advanced ...
The ODBC Backup Path is where data will be logged to in the event that your ODBC database fails. Any data that accumulates in the backup path can be merged into the ODBC database at any time by issuing the DatalogMergeToPrimary command.

A secondary path may be enabled in the case that the database specified in the ODBC Data Source is unavailable.

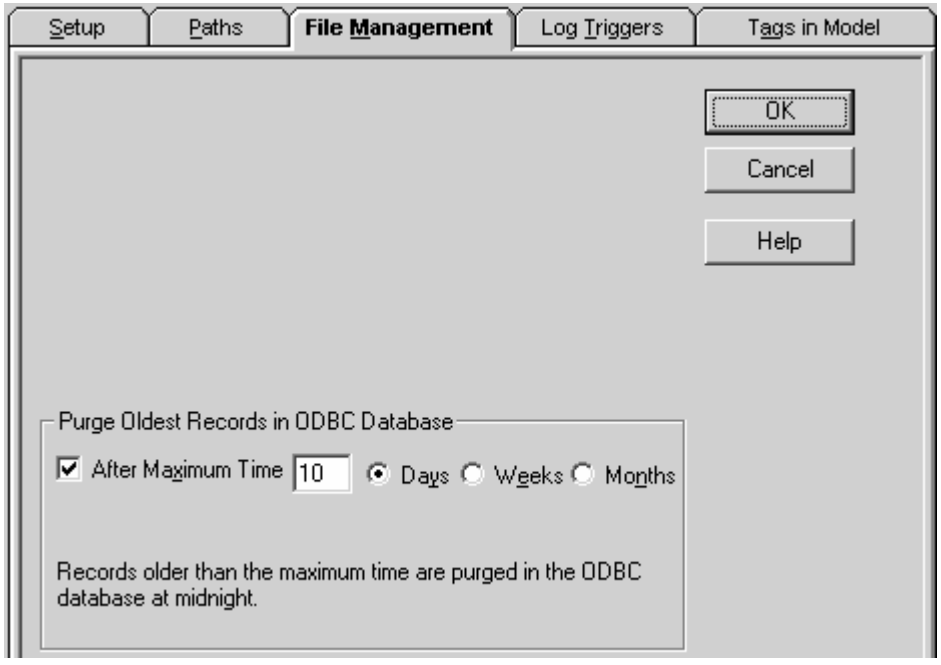
File Management Tab

File Set Logging:



Choose how you wish to handle file creation. You may use the `DataLogNewFile` command to create files manually.

ODBC Logging:

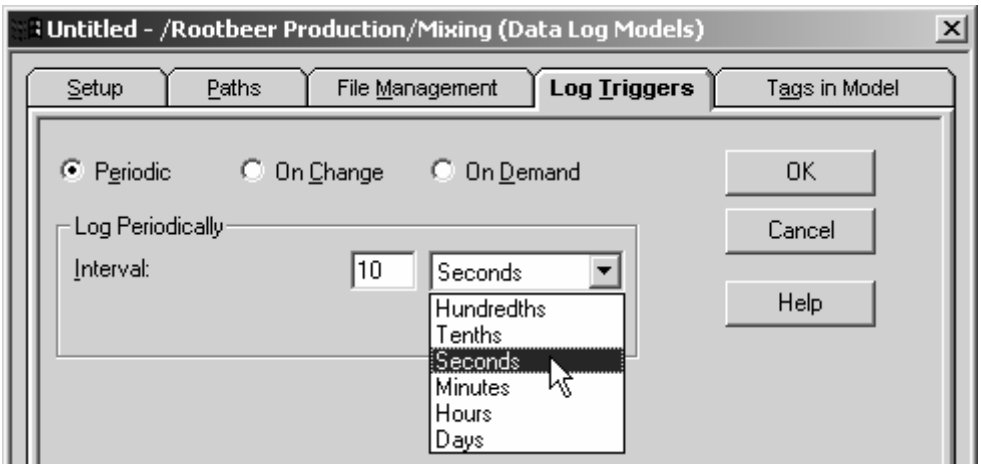


New files are not created with the database. You may have RSView automatically purge old records from the database.

Log Triggers Tab

Configure how often to collect data.

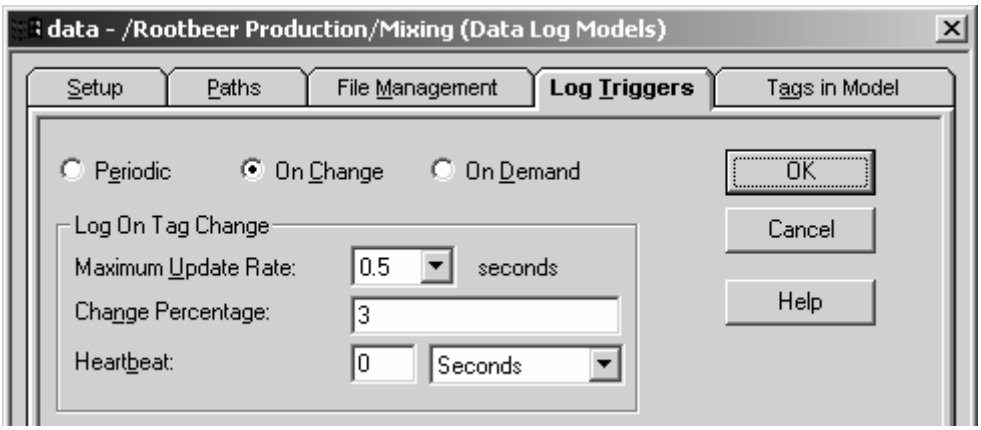
Periodic – specify the rate to collect all the tag data.



On Change – Use the On Change trigger to log tag values once a certain percentage of change in the value has occurred. The percentage is based on the tag's minimum and maximum (or High EU and Low EU) values. For example, specifying 10 means a tag's value must change by 10 percent to be logged. This applies to HMI tags only. If an HMI tag does not have maximum and minimum, or high EU and low EU values specified, any change in the tag's value will be logged. For data server tags, which do not have minimum/maximum properties, every change is logged.

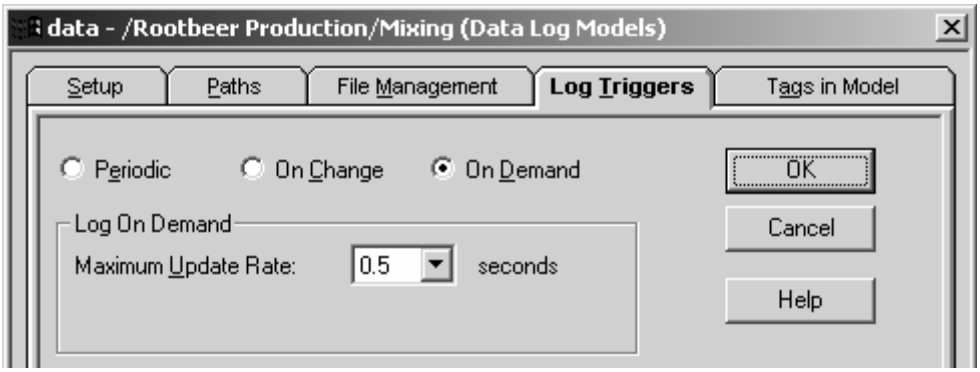
In addition, you may specify a Heartbeat to log data even if no change has occurred. The heartbeat ensures that the data in the log file is current. The heartbeat rate must be equal to or greater than the update rate.

Specify 0 for the heartbeat if you don't want to use it.

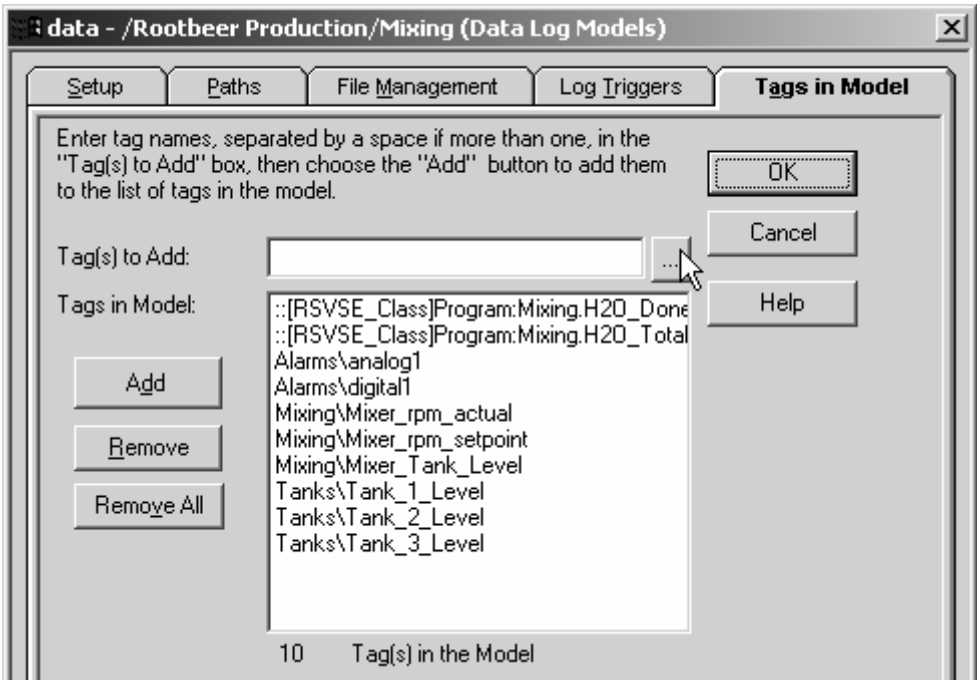


On Demand - Choose On Demand as the trigger to log data only when the RSView command `DataLogSnapshot` is issued. This command can be given anywhere that other RSView commands and macros can be. For example, it could be the typed in the command line, or specified as the action for an event. If you specify Periodic or On Change, you can still use on demand logging whenever it is appropriate.

Specify a Maximum Update Rate to limit the rate at which tags in the data log model will be updated. The default maximum rate is for tags to be updated is every .5 seconds.



Tags in Model Tab



Select the tags you wish to log by clicking the Tag Browser. A model may contain up to 10,000 tags. HMI Tags or directly referenced data server tags may be logged.

Starting and Stopping Data Logging

Configure as many data log models as you need to collect specific data.

There are many ways to start and stop data logging. Choose the way that works best for your application.

The ways to start data logging include

- In the Startup editor, select the Data Logging check box.
- Specify the `DataLogOn` command as the startup command in the Display Settings dialog in the Graphic Display editor.
- Add the `DataLogOn` command to a startup or login macro.
- Type the `DataLogOn` command on the command line in RSView Studio or the Administration Console.
- Create a button object, and attach the `DataLogOn` command to it.
- Create a graphic object and attach object, display or client key animation with the `DataLogOn` command as the action. When the key is pressed, data logging starts.
- Enter the `DataLogOn` command as the action for an event.

The ways to stop data logging include

- Add the `DataLogOff` command to a shutdown or logoff macro.
- Specify the `DataLogOff` command as the shutdown command in the Display Settings dialog in the Graphic Display editor.
- Type the `DataLogOff` command on the command line in RSView Studio or the Administration Console.
- Create a button object, and attach the `DataLogOff` command to it.
- Create a graphic object and attach object, display or client key animation with the `DataLogOff` command as the action. When the key is pressed, data logging stops.
- Enter the `DataLogOff` command as the action for an event.

When you use the `DataLogOn` and `DataLogOff` commands you need to specify the model name. If you use an asterisk (*) with either command, it turns logging of all models on or off.

Lab 9 – Data Logging

Objective: In this lab, you will collect data and view it in an ODBC data source. You will also collect data in a File Set to be used for historical trending in a later lab.

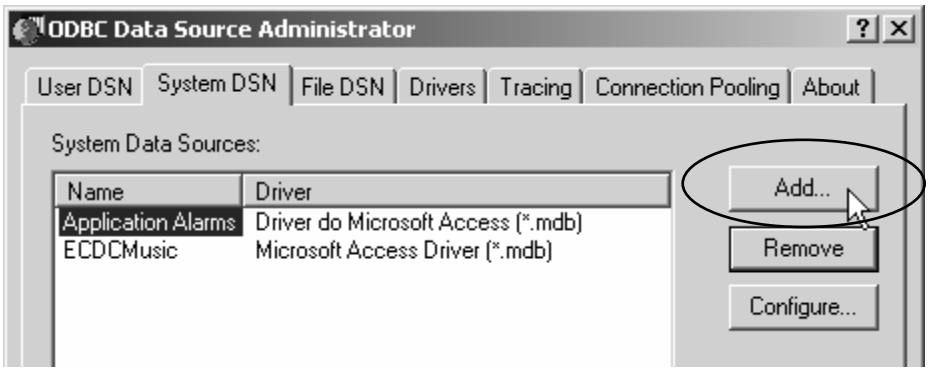
Software Requirements:

- RSView Studio
- SoftLogix 5860 running RSView_Class_SoftLogix program
- Microsoft Access

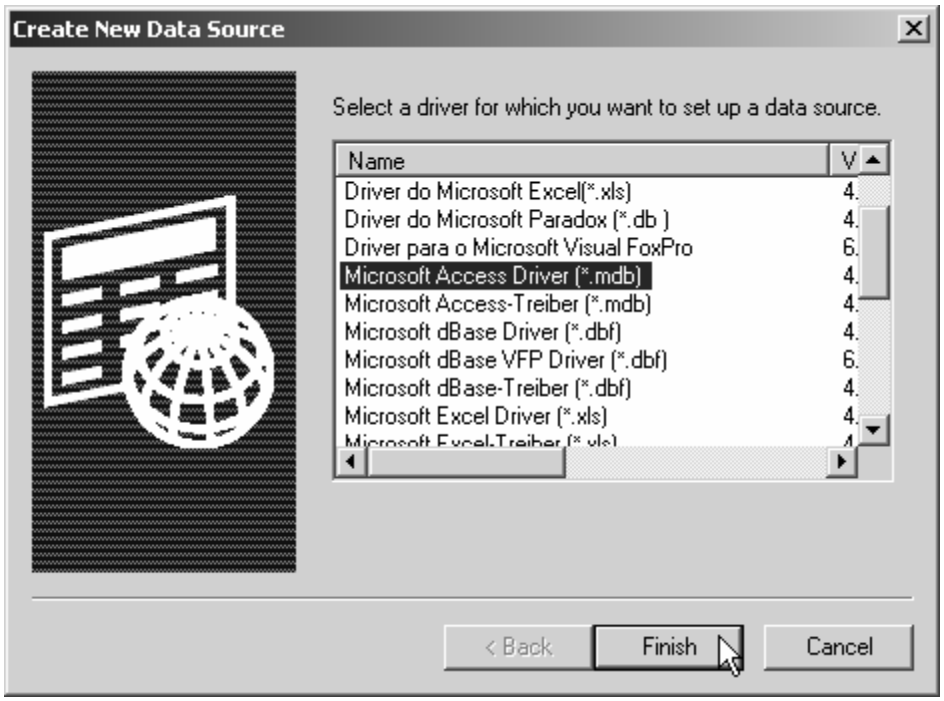
1. Create an ODBC Data Source

- You will log data to an Access database. You must create a Windows ODBC Data Source before this can happen.
- Open the Windows Control Panel (Start, Settings)
- Double click **Administrative Tools**. Double-click **Data Sources (ODBC)**

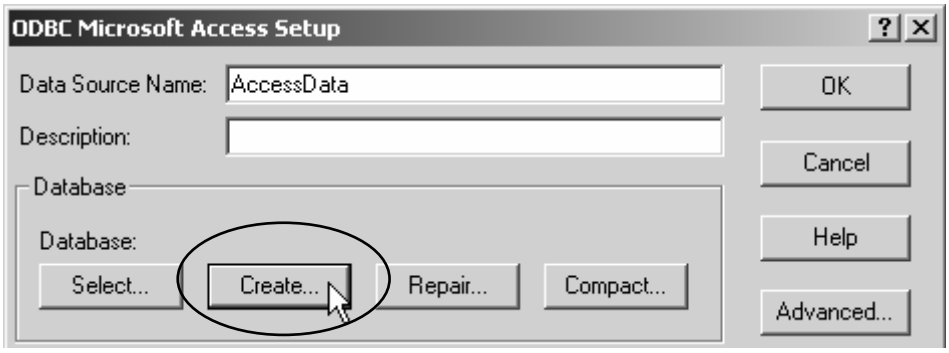
- Click on the **System DSN** tab. Click **Add** to create a new System Data Source Name.



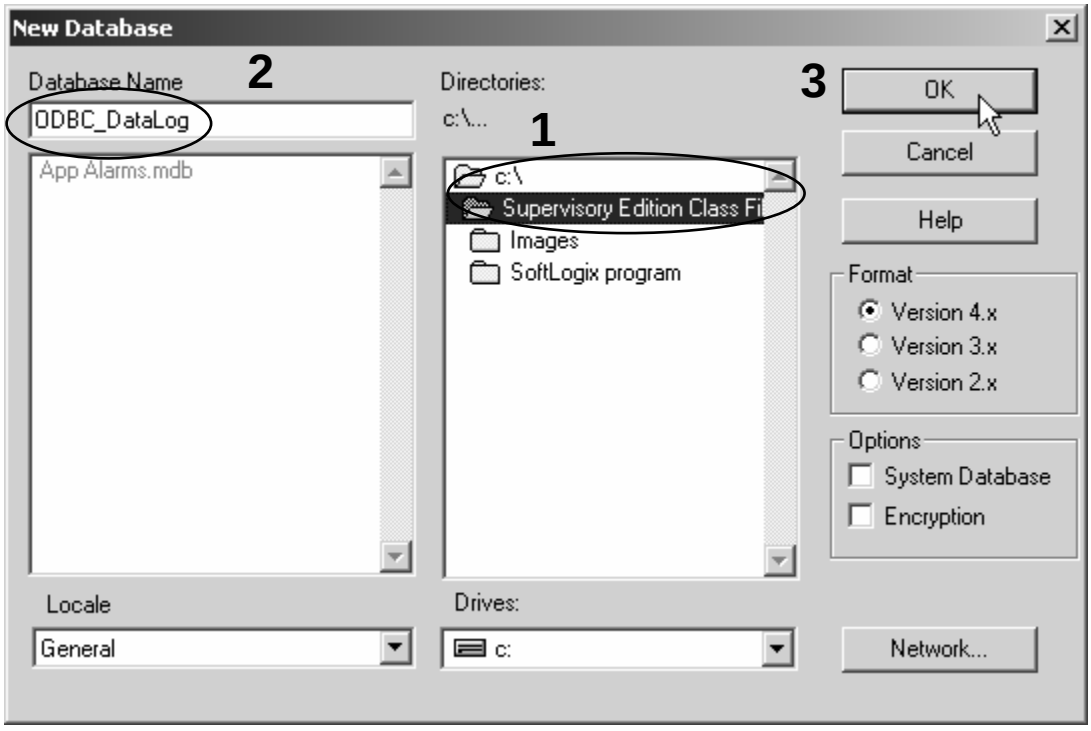
- Select the **Microsoft Access Driver** and click **Finish**.


Create New Data Source
Select a driver for which you want to set up a data source.
Name
Driver do Microsoft Excel(*.xls)
Driver do Microsoft Paradox (*.db)
Driver para o Microsoft Visual FoxPro
Microsoft Access Driver (*.mdb)
Microsoft Access-Treiber (*.mdb)
Microsoft dBase Driver (*.dbf)
Microsoft dBase VFP Driver (*.dbf)
Microsoft dBase-Treiber (*.dbf)
Microsoft Excel Driver (*.xls)
< Back
Finish
Cancel

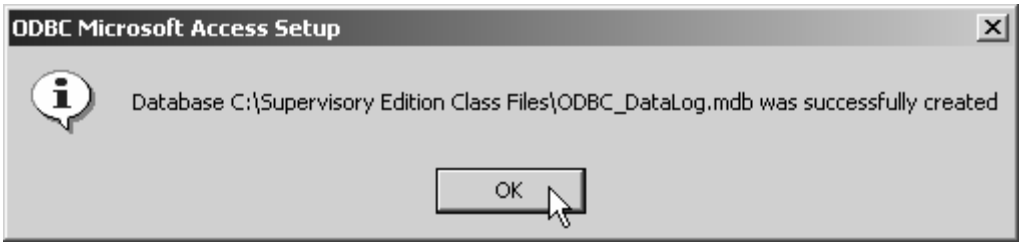
- Type the name **AccessData**. Click **Create** to create a new database.



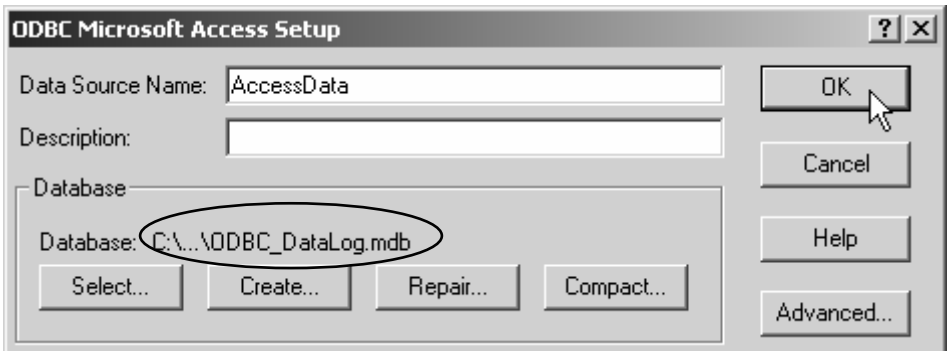
- Create a new Access database in the **Supervisory Edition Class Files** folder.
- Call it **ODBC_DataLog**.
- Click **OK**.



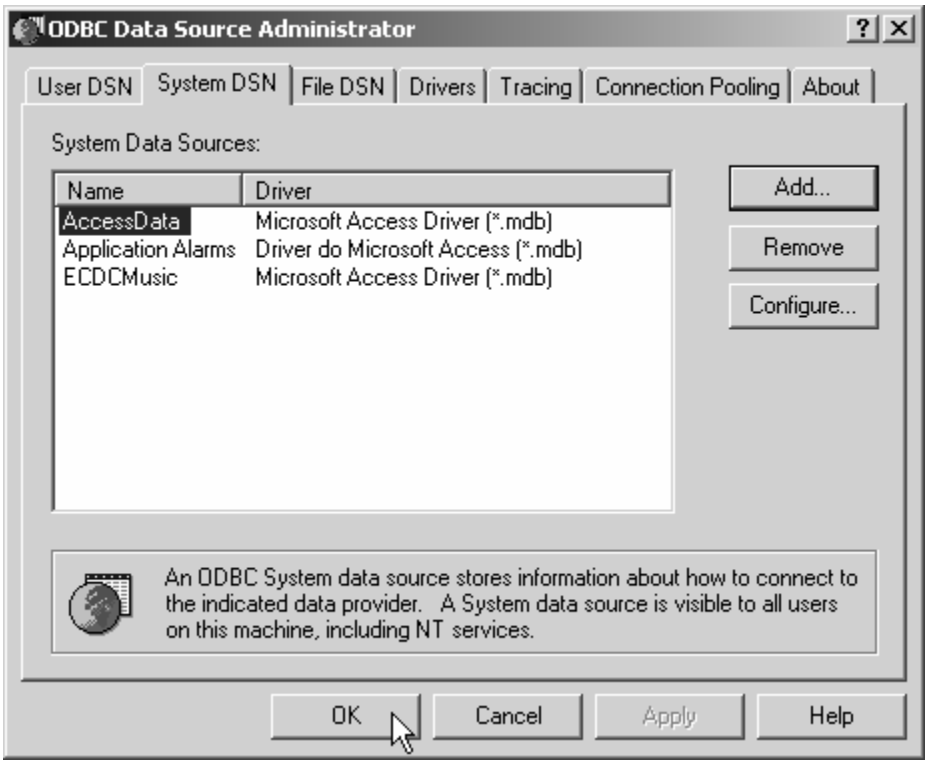
- Click **OK** to acknowledge the file creation.



- Click **OK** to accept the setup. Note the Database file is specified.

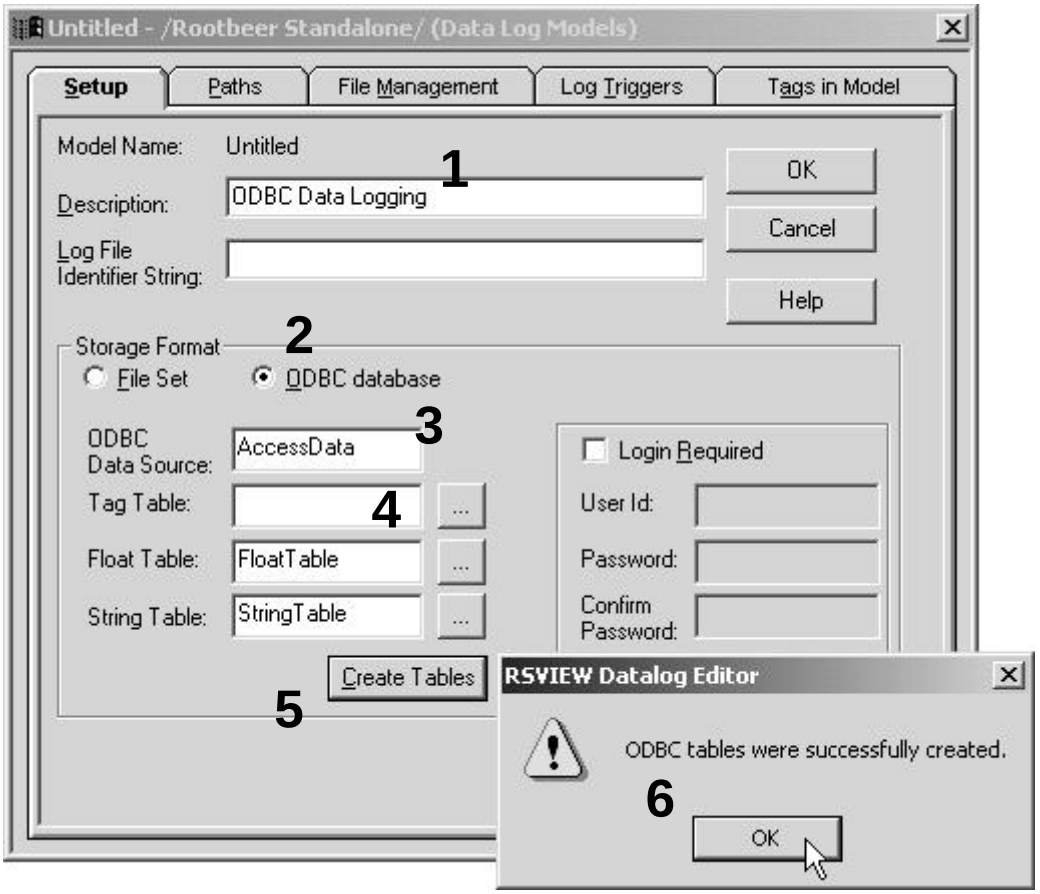


- The new System DSN has been configured. Click **OK**.

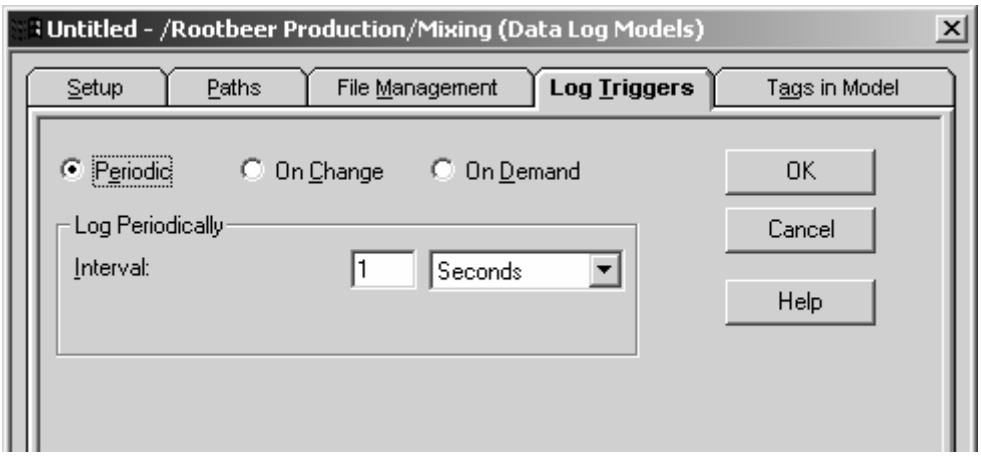


2. Return to RSView Studio

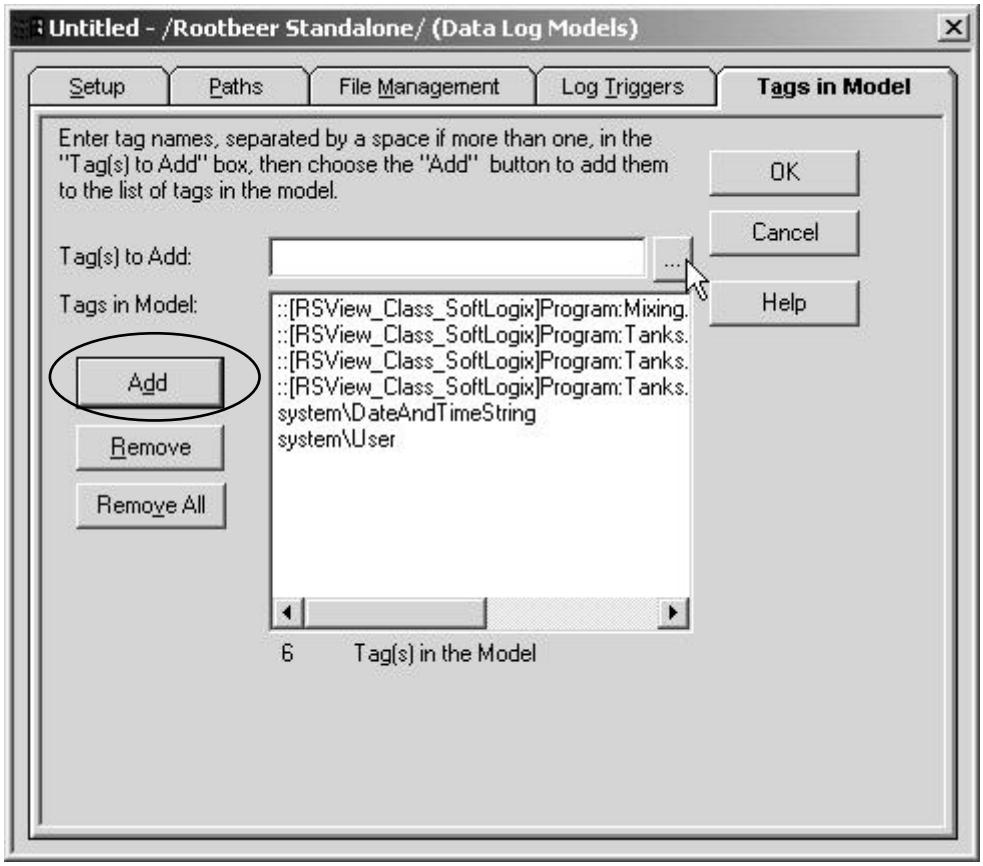
- Create a new Data Log Model the **File, New, Data Log** menu option. You may also right-click on the Data Log Models icon in the Application Explorer.
- Setup Tab
    1. Add a description
    2. Select ODBC database
    3. Enter the name of the Data Source you created in the last step
    4. Delete the entry for the Tag Table
        - By not creating a Tag Table, the tag names (rather than index numbers) will appear with the data in the other tables.
    5. Click **Create Tables**
    6. Click **OK** to confirm that the tables have been created.



- Log Triggers Tab – Configure the model to collect data every 1 second.

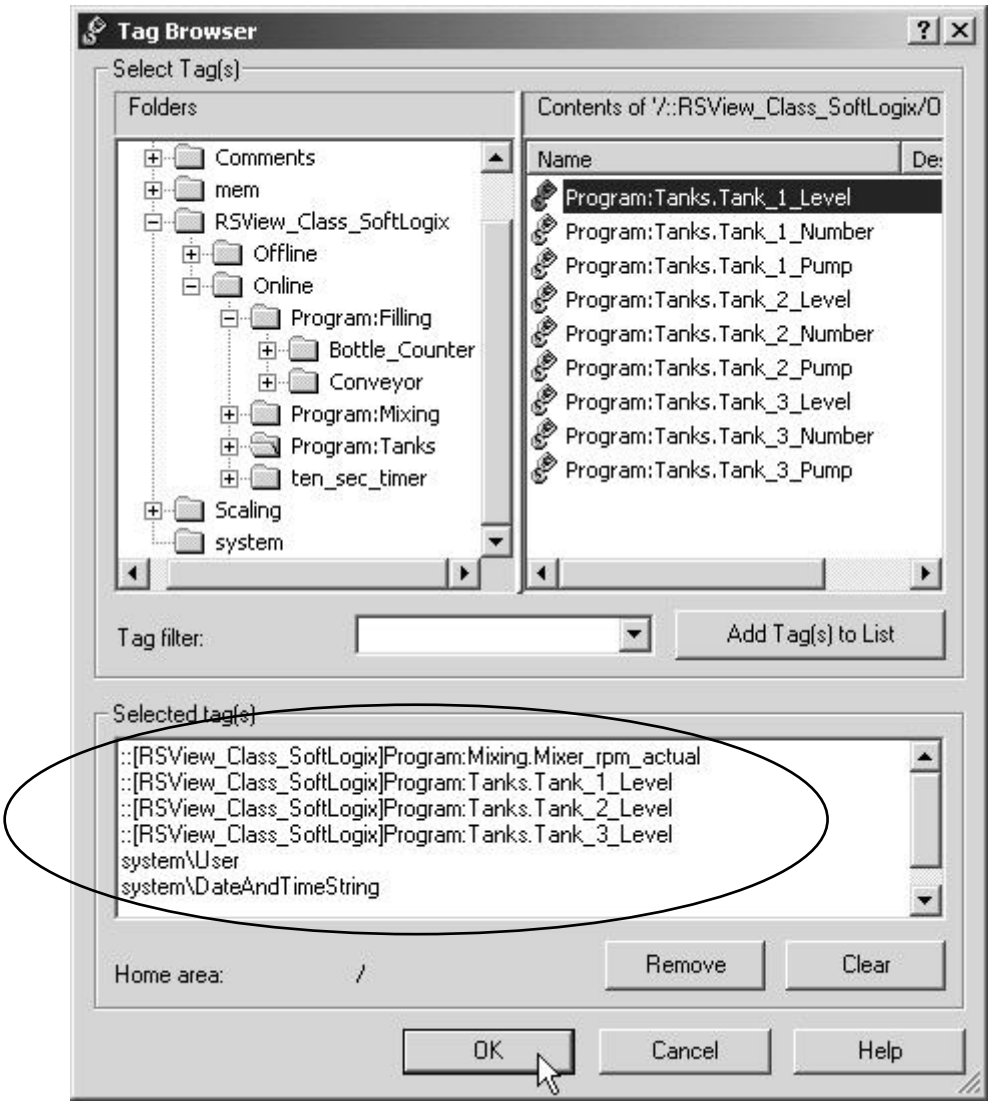


- Tags in Model Tab – select the tags to log by using the **Tag Browser** and **Add** button.



See the next page for the Tag Browser and tags to choose:

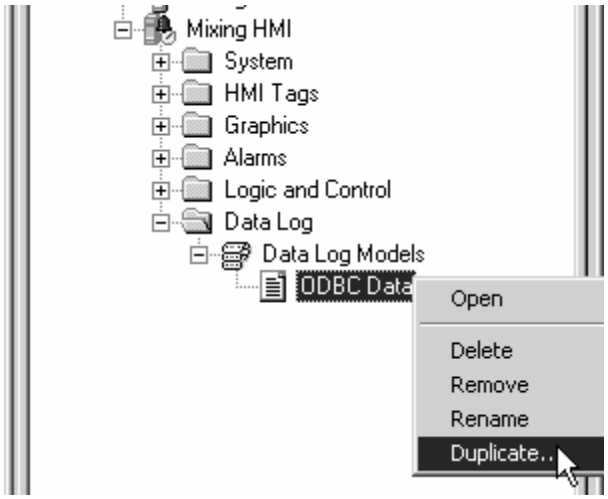
- Browse for and select the following (6) tags.



- Click **OK** when you are done with the Data Log Model configuration. Save the model as **ODBC Data**.

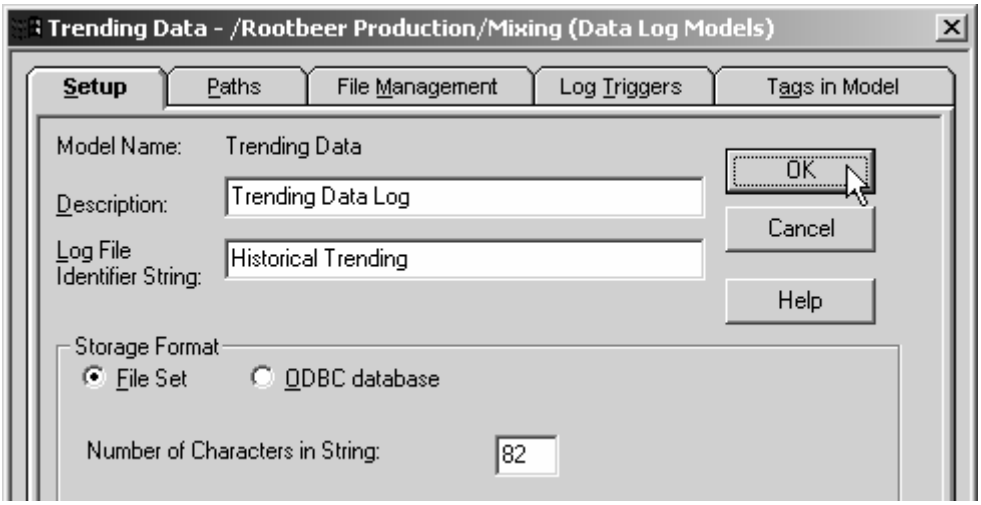
3. Create a second Data Log Model

- Duplicate the existing model by right-clicking it in the Application Explorer and selecting **Duplicate**.



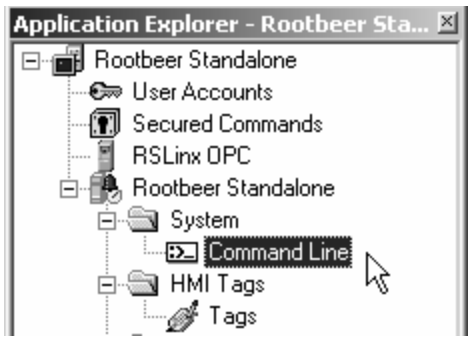
- Call it **Trending Data**

- Double-click the model to open it. Change the storage format from ODBC to File Set. Change the Description, and add an identifier string to be attached to the file names. Click **OK** to save the changes.



4. Test the Data Logging

- Open a command line in your HMI Project

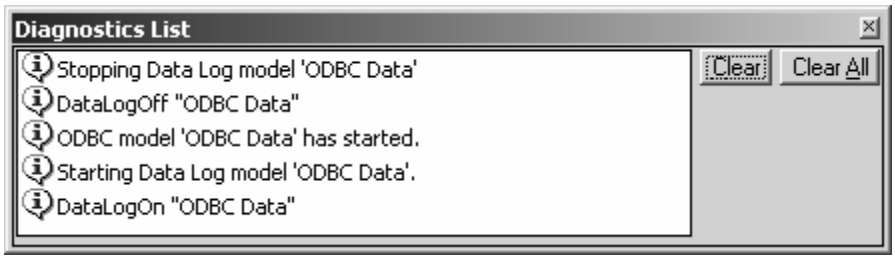


- Issue the `DataLogOn` command for the ODBC data log model:

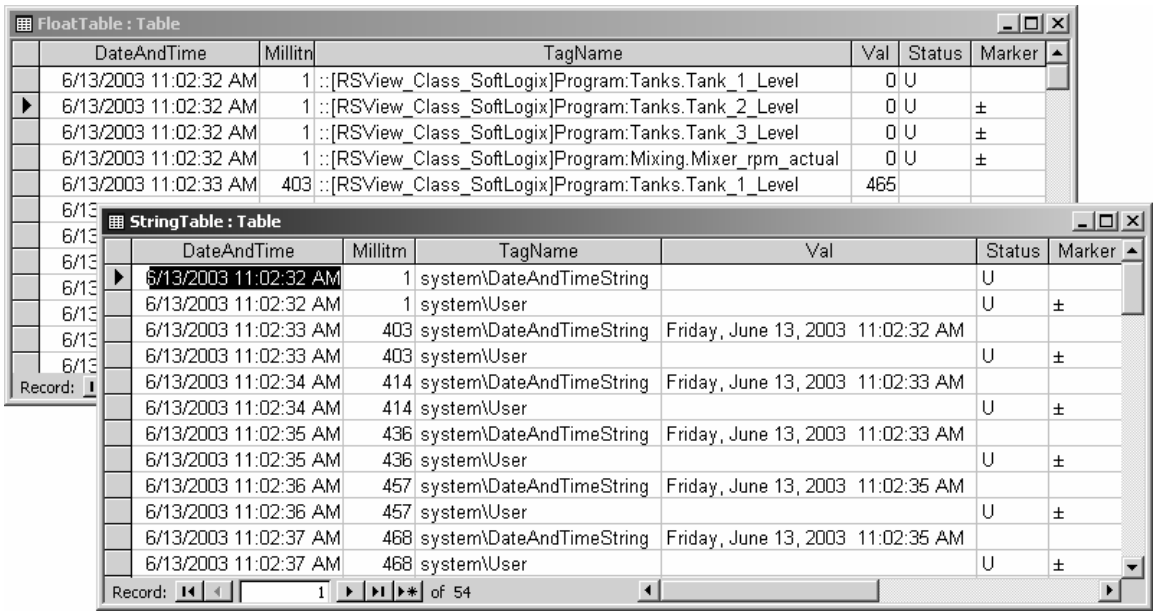
  Tip – Use the Command Wizard to automatically build the command.

- Let the command run for around 10 seconds, then stop data logging:

- Note the entries in the Diagnostics List:



- Open the **ODBC_DataLog.mdb** database and confirm that you have logged the numeric and string data:



FloatTable : Table

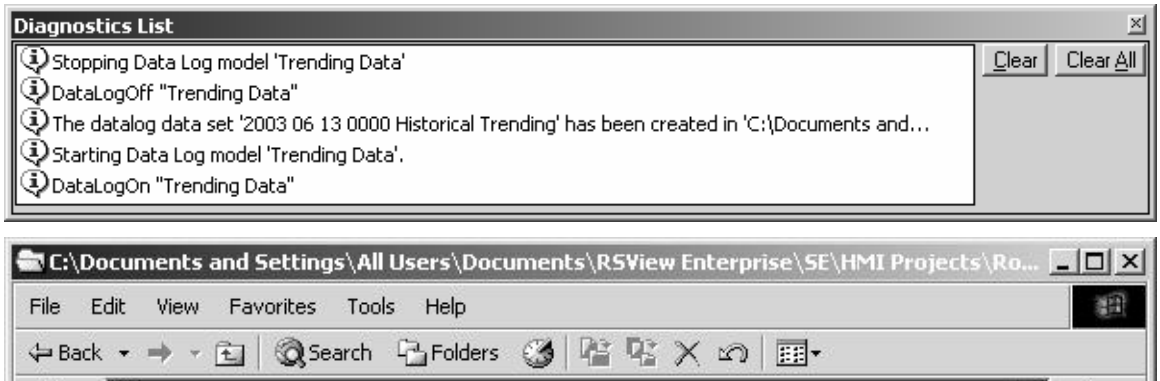
DateAndTime	Millitn	TagName	Val	Status	Marker
6/13/2003 11:02:32 AM	1	::[RSView_Class_SoftLogix]Program:Tanks.Tank_1_Level	0	U	
6/13/2003 11:02:32 AM	1	::[RSView_Class_SoftLogix]Program:Tanks.Tank_2_Level	0	U	±
6/13/2003 11:02:32 AM	1	::[RSView_Class_SoftLogix]Program:Tanks.Tank_3_Level	0	U	±
6/13/2003 11:02:32 AM	1	::[RSView_Class_SoftLogix]Program:Mixing.Mixer_rpm_actual	0	U	±
6/13/2003 11:02:33 AM	403	::[RSView_Class_SoftLogix]Program:Tanks.Tank_1_Level	465		

StringTable : Table

DateAndTime	Millitm	TagName	Val	Status	Marker
6/13/2003 11:02:32 AM	1	system\DateAndTimeString		U	
6/13/2003 11:02:32 AM	1	system\User		U	±
6/13/2003 11:02:33 AM	403	system\DateAndTimeString	Friday, June 13, 2003 11:02:32 AM		
6/13/2003 11:02:33 AM	403	system\User		U	±
6/13/2003 11:02:34 AM	414	system\DateAndTimeString	Friday, June 13, 2003 11:02:33 AM		
6/13/2003 11:02:34 AM	414	system\User		U	±
6/13/2003 11:02:35 AM	436	system\DateAndTimeString	Friday, June 13, 2003 11:02:33 AM		
6/13/2003 11:02:35 AM	436	system\User		U	±
6/13/2003 11:02:36 AM	457	system\DateAndTimeString	Friday, June 13, 2003 11:02:35 AM		
6/13/2003 11:02:36 AM	457	system\User		U	±
6/13/2003 11:02:37 AM	468	system\DateAndTimeString	Friday, June 13, 2003 11:02:35 AM		
6/13/2003 11:02:37 AM	468	system\User		U	±

Record: 1 of 54

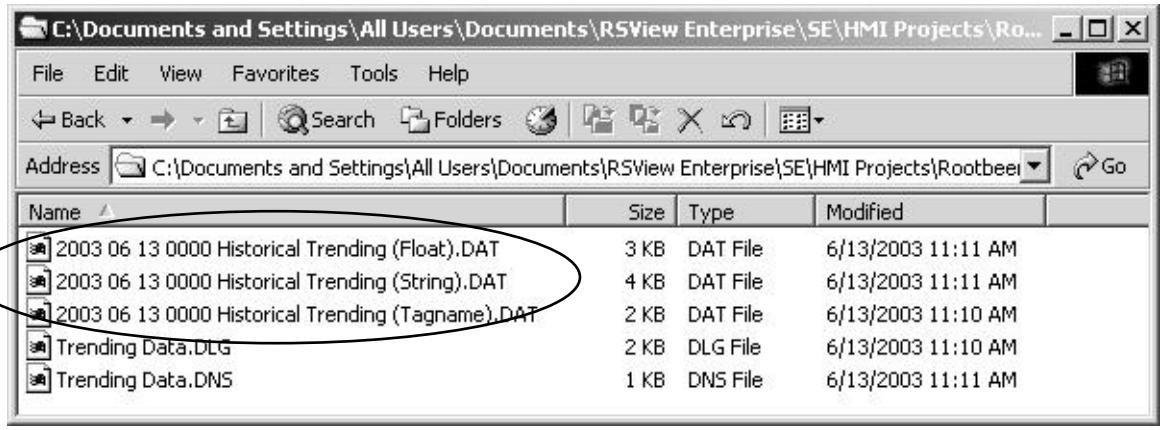
- Run the **Trending Data** data log model. The values will be displayed in a graphical trend later. Verify that the files were created in the location specified in the data log model. Files are located in the HMI Project directory by default.



Diagnostics List

Stopping Data Log model 'Trending Data'
DataLogOff "Trending Data"
The datalog data set '2003 06 13 0000 Historical Trending' has been created in 'C:\Documents and...
Starting Data Log model 'Trending Data'.
DataLogOn "Trending Data"

Clear | Clear All



C:\Documents and Settings\All Users\Documents\RSView Enterprise\SE\HMI Projects\Ro...

File Edit View Favorites Tools Help

Back Search Folders

Address C:\Documents and Settings\All Users\Documents\RSView Enterprise\SE\HMI Projects\Rootbeer Go

Name	Size	Type	Modified
2003 06 13 0000 Historical Trending (Float).DAT	3 KB	DAT File	6/13/2003 11:11 AM
2003 06 13 0000 Historical Trending (String).DAT	4 KB	DAT File	6/13/2003 11:11 AM
2003 06 13 0000 Historical Trending (Tagname).DAT	2 KB	DAT File	6/13/2003 11:10 AM
Trending Data.DLG	2 KB	DLG File	6/13/2003 11:10 AM
Trending Data.DNS	1 KB	DNS File	6/13/2003 11:11 AM

This Lab is Finished.

9. *Trending Data*

Objectives:

- Create Trends in an HMI graphic display
- Configure Trend properties
- Configure a trend to display both real-time and historical data
- Capture and overlay snapshots of trend data
- Create trend templates

RSView Trending

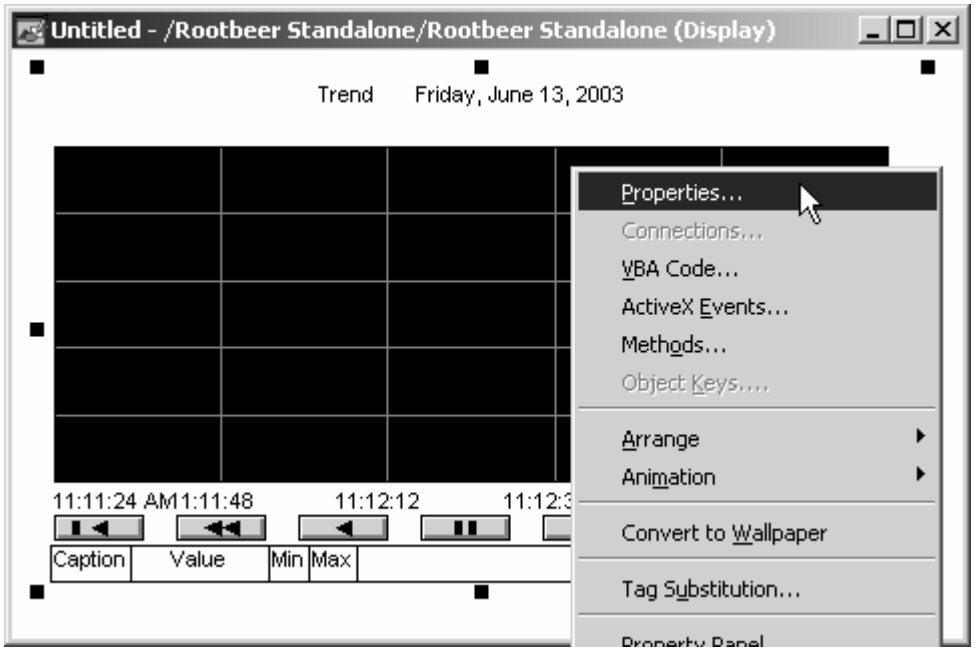
Trends allow you to visualize data in your RSView project. There are two ways to look at data:

- use trends to see real-time data as it is generated by the HMI Server
- analyze historical data collected with local or remote data log file sets

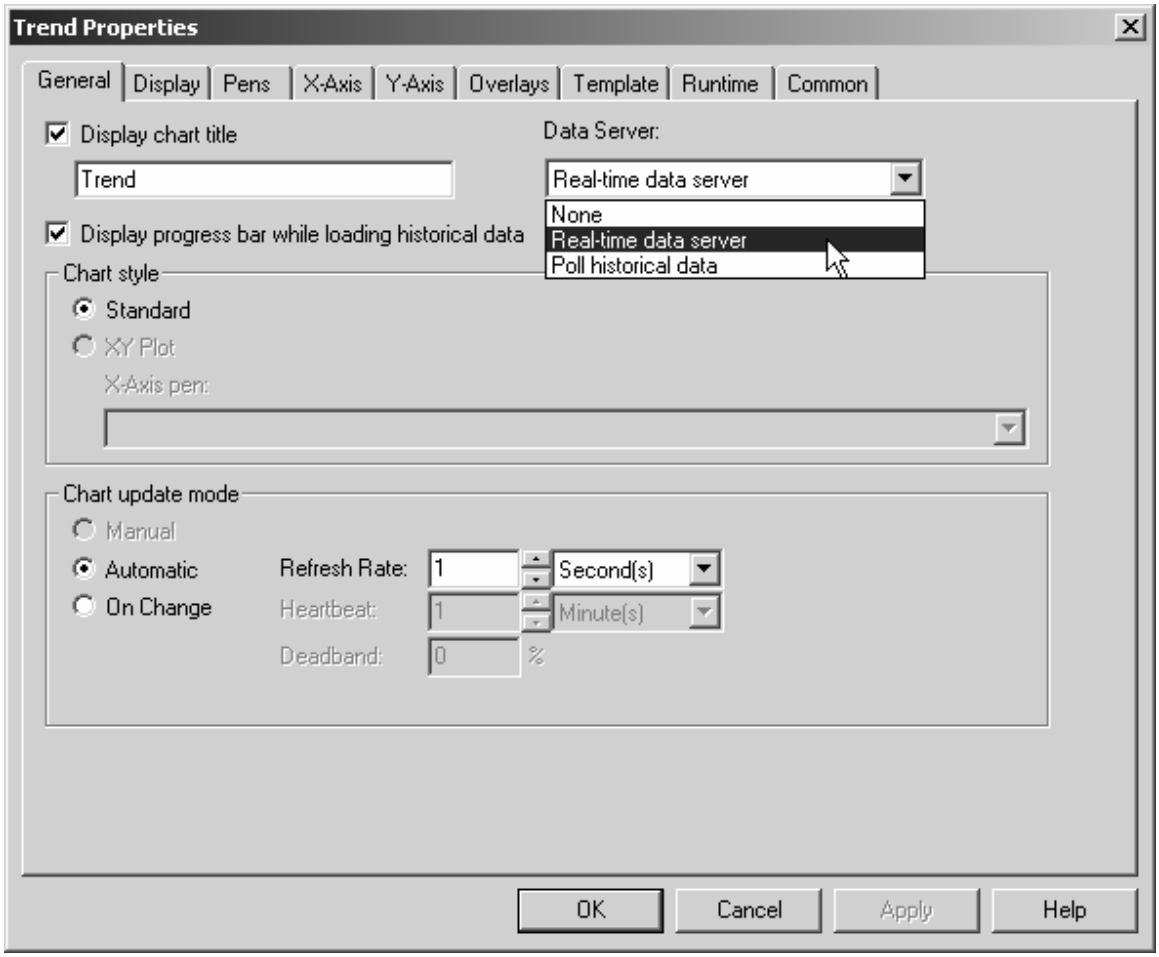
Creating a Trend

Trends are graphic display objects used in an HMI Project. Select the **Trend** tool from the **Objects, Advanced** menu. Draw a rectangle in the graphic to define the size of the trend.

Double-click the trend, or right-click and select **Properties**, to configure it.



General Tab



Display chart title - Displays a title at the top of the chart during run time. Select the check box and type up to 80 characters. The title includes the text that you type along with the current date.

Data server

Specify a server to provide data to the Trend.

None - Retrieves data from another source using the Trend object model.

Real-time data server - Retrieves data automatically from RSView

Poll historical data - Retrieves the newest historical data from the data server. When using historical polling, the Current Value legend does not display pen icons or pen values.

Display progress bar while loading historical data

Select this option to display a progress bar with a Cancel button while loading data into the Trend. Providing this option allows operators to cancel a request for data.

Chart style

Determines the plotting style of the chart. A TrendX chart can either plot values against time or against a selected pen.

Chart update mode

Manual

This option is only available when the Data Server is set to None. It does not apply when using the real-time data server.

Use this chart mode if you need to log data faster than once every 50 milliseconds, or if you need to maintain control over data timestamps. In Manual mode, the container that holds the Trend sends data to the chart using the NewData method (part of the TrendX object model). The NewData method can send accumulated batches of data to TrendX in bursts, allowing points to be logged more frequently than once every 50 milliseconds. The container manages the chart timing, maintains control over the timestamps, and sends the Trend an array with new data for each point at the intervals specified in the NewData method. The intervals indicate the spacing of the data in the array. Control over timestamps can be useful if the data is recorded in blocks by another system.

Automatic

Use this chart mode when you want TrendX to update itself periodically. In Automatic mode, the refresh rate controls how often the chart acquires data. The refresh rate limits are 50 milliseconds to 596 hours. Do not make the refresh rate faster than the rate at which data is updated in the data server, OPC server or DDE server.

On Change

Use this chart mode when you want TrendX to update itself as data values change. In On Change mode, real-time data updates in the TrendX chart immediately, as the values change. To avoid missing data between updates, you may want to select the On Change mode when working with data that changes infrequently. Set the trigger for updates using either a heartbeat rate or a deadband percentage.

Heartbeat - Specifies the maximum amount of time between updates. If the value of a pen has not changed within the amount of time specified, the chart displays the current value. Setting the heartbeat rate to 0 disables the heartbeat.

Deadband - Specifies a percentage by which a value must change before the chart displays the next value. Setting the deadband rate to 0 updates the chart whenever the value changes.

Display Tab

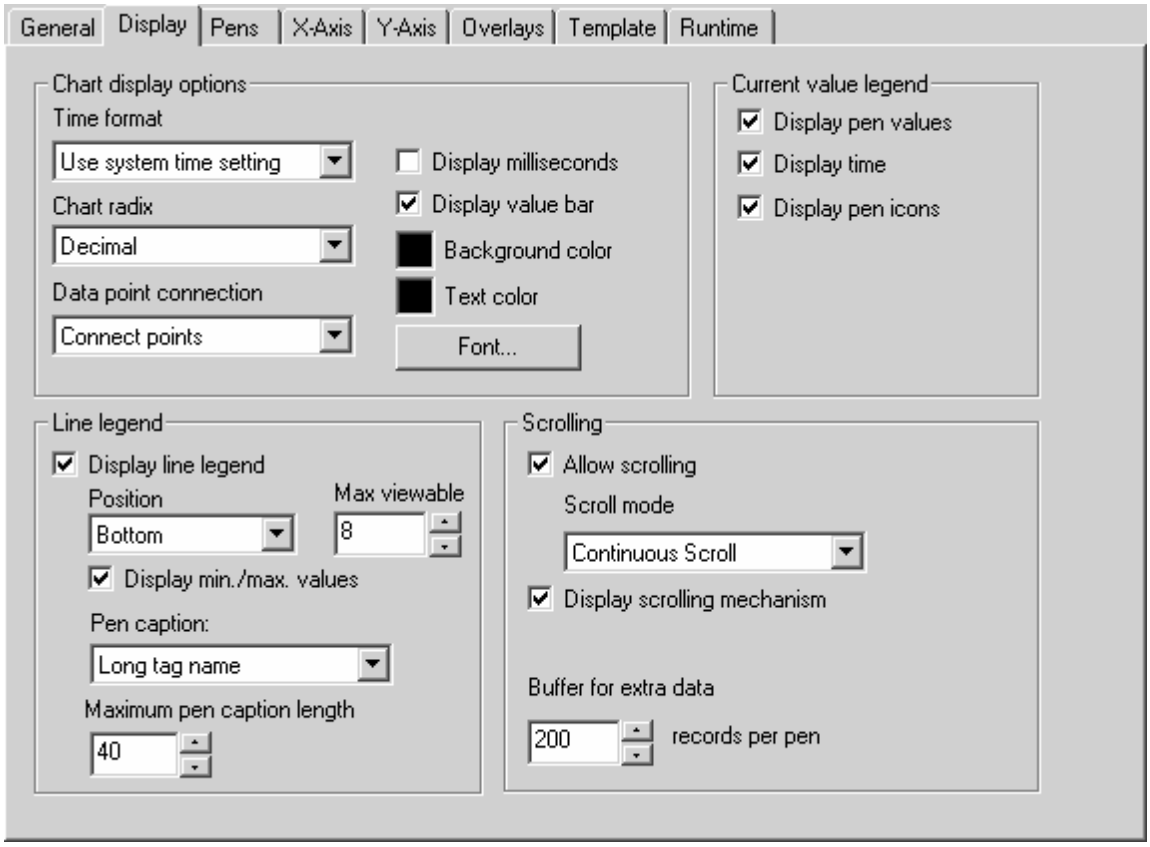


Chart display options

Time format

Determines whether the Trend displays time in 24-hour format or in AM / PM format. This setting affects every time display in the Trend. Click "Use system time setting" to use the date format specified in the Windows Control Panel, in the Regional Options dialog box.

Chart radix

Determines the number base (decimal, hexadecimal, or octal) used to display numeric values on the chart. This setting affects numbers on the y-axis, current value legend, value bar, tool tips, and the x-axis if XY plot is selected. If the number of decimal places on the Y-Axis tab is set to anything other than 0, it overrides the radix selection and displays numbers as decimals.

Data point connection

Determines whether data points on the chart are connected with a line or not connected.

Current value legend

The options in this group determine which types of pen information display in a current value legend. By default, the current value legend is displayed to the right of the trend chart. However, if the line legend is set to appear at the bottom of the trend chart, the current value legend is displayed as part of the line legend.

Line legend

The options in this group determine which types of trend line information display in a line legend.

Allow scrolling

Determines whether to continually update the chart with new data during run time. If you clear the Allow Scrolling check box, data is not plotted on the trend. Instead, the data buffer fills with trend data until the buffer limit is reached. The chart will not update until the operator toggles the scroll mode manually (using the Pause button.

Scroll mode - If you allow the chart to scroll and update with new data during run time, specify:

- Continuous scroll. The chart scrolls from the right to the left for each new data reading.
- Half Screen scroll. As the trend data is plotted, the chart scrolls half a screen at a time. Pens scroll from the left to the right, starting at the left of the chart. When the pens reach the right-hand side of the chart, the chart scrolls half a screen and the pens begin plotting values again in the center of the chart.
- Full Screen scroll. The chart scrolls a full screen at a time while data is plotted. Pens scroll from the left to the right, starting at the left-most side of the screen. When the pens reach the right side of the screen, the entire screen scrolls and the pens scroll again, beginning at the left side. Use this scrolling option with overlays.

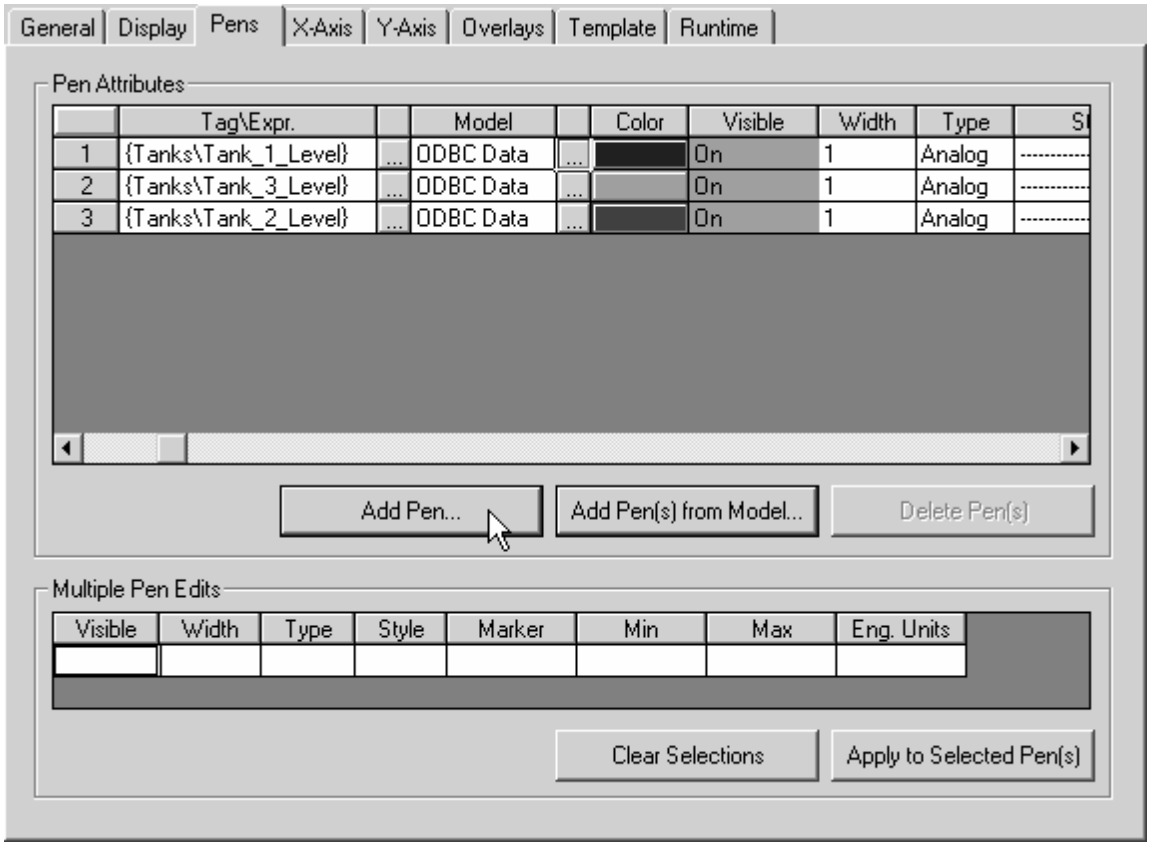
Display scrolling mechanism

Determines whether a mechanism to allow manual scrolling is displayed with the chart. Use the VCR-style buttons to scroll through trend data. The buttons allow operators to scroll backward and forward through data and to toggle between pausing and resuming automatic scrolling.

Buffer for extra data

Sets the number of extra data points outside of the display area that are stored for the operator to view by manual scrolling. When the buffer is full, old data drops off. The buffer size is limited to 32,767 data points per pen. To set the buffer size, specify the number of extra points to retain for each pen.
Scrolling is faster when data points are held in the buffer, however, larger buffer sizes require more system resources. If you notice run time chart performance slowing down, you may want to reduce the number of data points held in the buffer.

Pens Tab



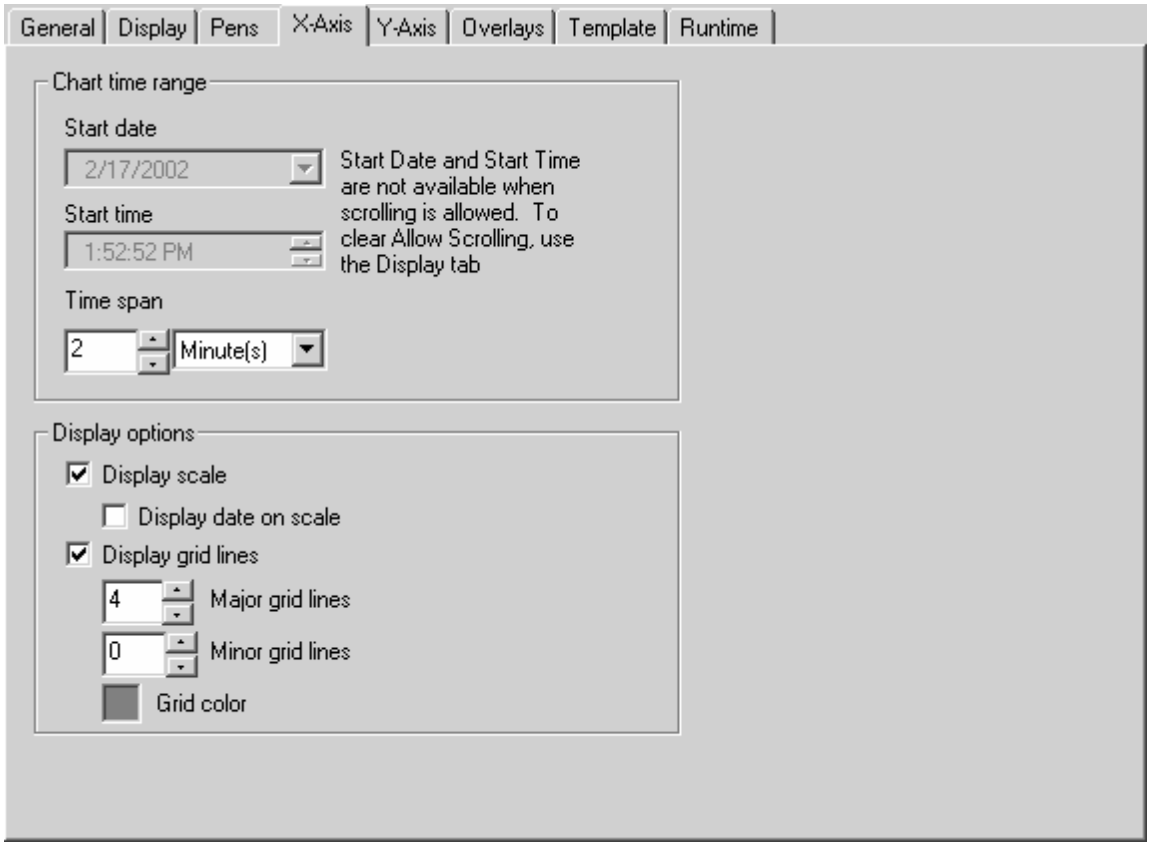
Use this tab to add and set up pens on a TrendX chart control.

To add a pen to the Trend, click the Add Pen button. The Expression Editor will show, allowing you to browse for tags.

To add a pen from a data log model to the Trend, click the Add Pen(s) from Model button.

You may edit pen properties to multiple pens at once. Select multiple pens in the Pen Attributes box by pressing and holding the Ctrl key while clicking the tag names. In the Multiple Pen Edits box, specify the attributes you want to apply to all of the selected pens, and then click the Apply to Selected Pens button.

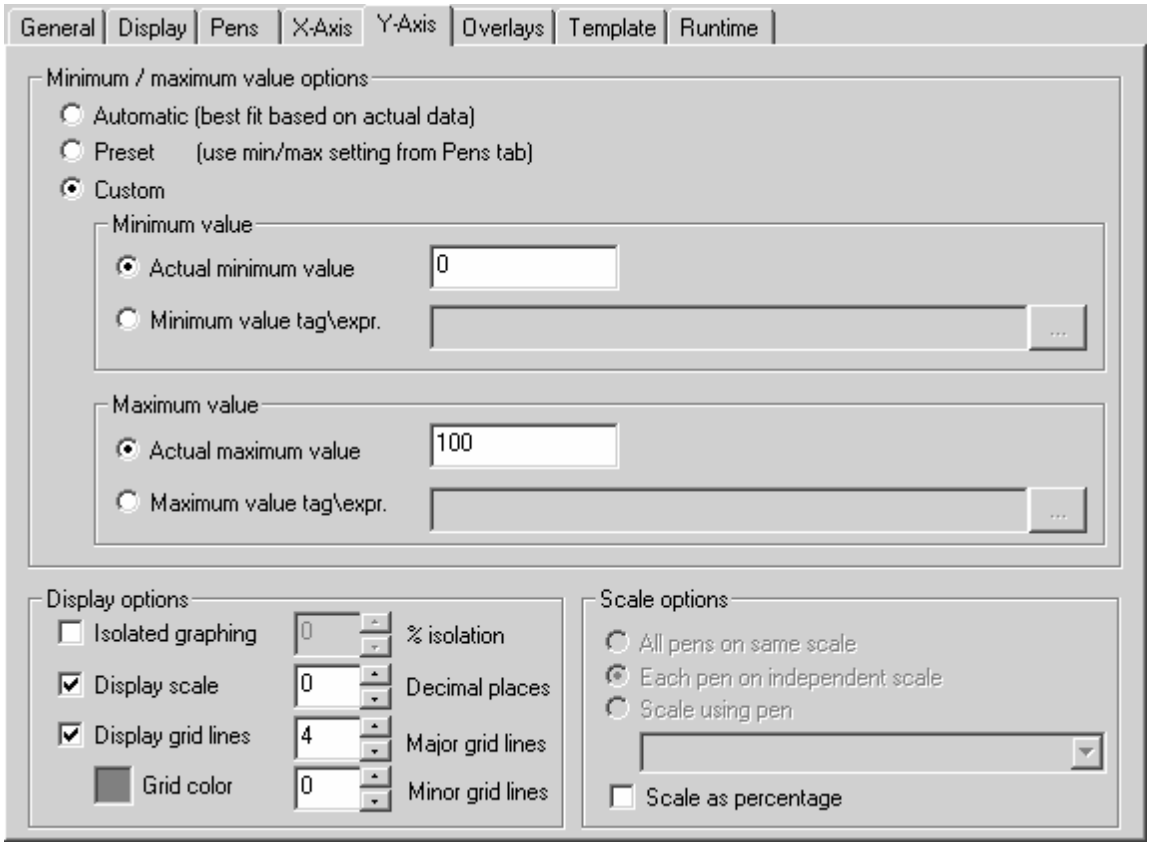
X-Axis Tab



Use the TrendX properties - X-Axis tab to set up the run time chart's horizontal axis. The horizontal axis represents time for a standard line chart or the selected pen value for an x-y plot. (Specify the chart style on the General tab.)

Fix a time to start displaying historical data with the time range settings. If you allowed scrolling in the Display tab, the start time is grayed out.

Y-Axis Tab



Use this tab to set up the run time chart's vertical axis.

Configure the min and max values of the Y axis:

- Automatic (best fit based on actual data) The lowest data reading serves as the minimum value and the highest data reading serves as the maximum. As the chart acquires new data, the y-axis may re-scale to fit.
- Preset (use min / max setting from Pens tab) The lowest and highest minimum and maximum tag values, set up on the Pens tab, serve as the y-axis scale. As the chart acquires new data, the y-axis does not re-scale.
- Custom Specify minimum and maximum values by typing in constants, or referring to a tag for the values.

Snapshots and Trend Overlays

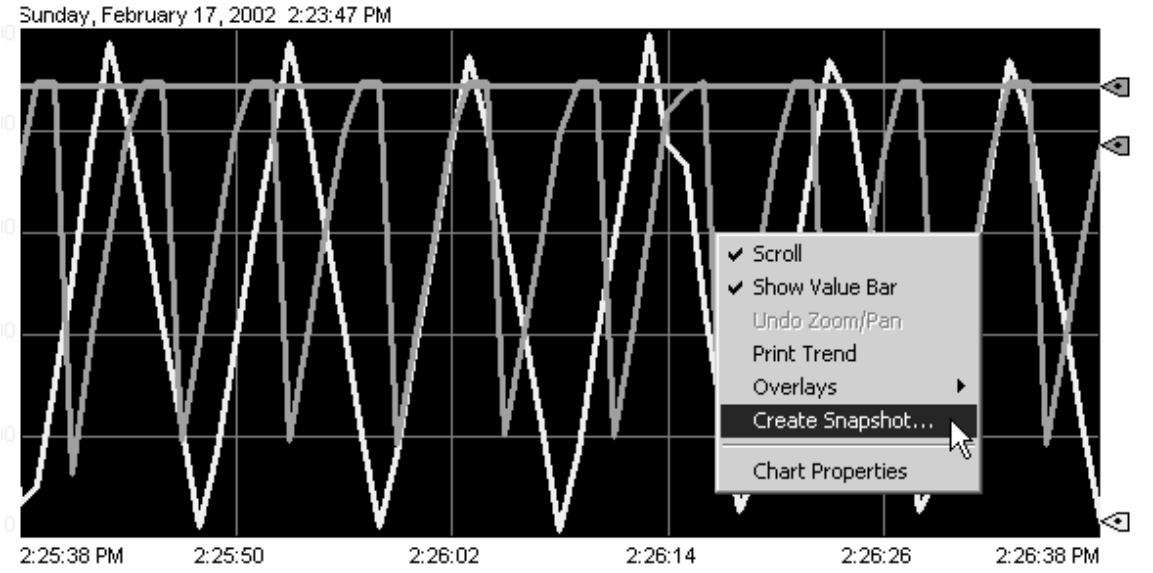
You can capture and save a snapshot of graphed data and then layer that saved data over currently trending data. This feature allows you to easily overlay and compare historical data with current data or any multiple sets of data.

Use the TrendX properties - Overlays tab to add snapshots to the Trend, set up the point at which each snapshot overlays and anchors on the chart, determine whether each snapshot is initially shown or hidden on the run time chart, and remove snapshots from the Trend.

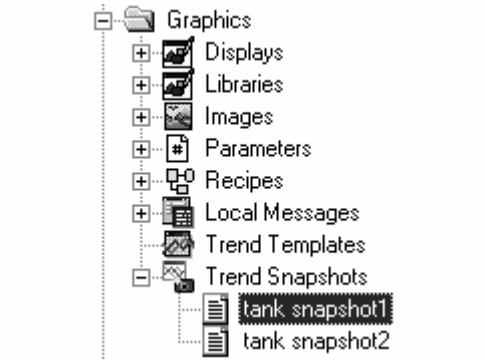
To create a snapshot

Before you can add a snapshot to a Trend and set it up as an overlay, you must create one. (Settings on the Runtime tab control an operator's ability to create snapshot during run time.)

1. Run the Trend.
2. Right-click the run time chart and then click Create Snapshot.
3. Type a name in the component editor and then click OK.



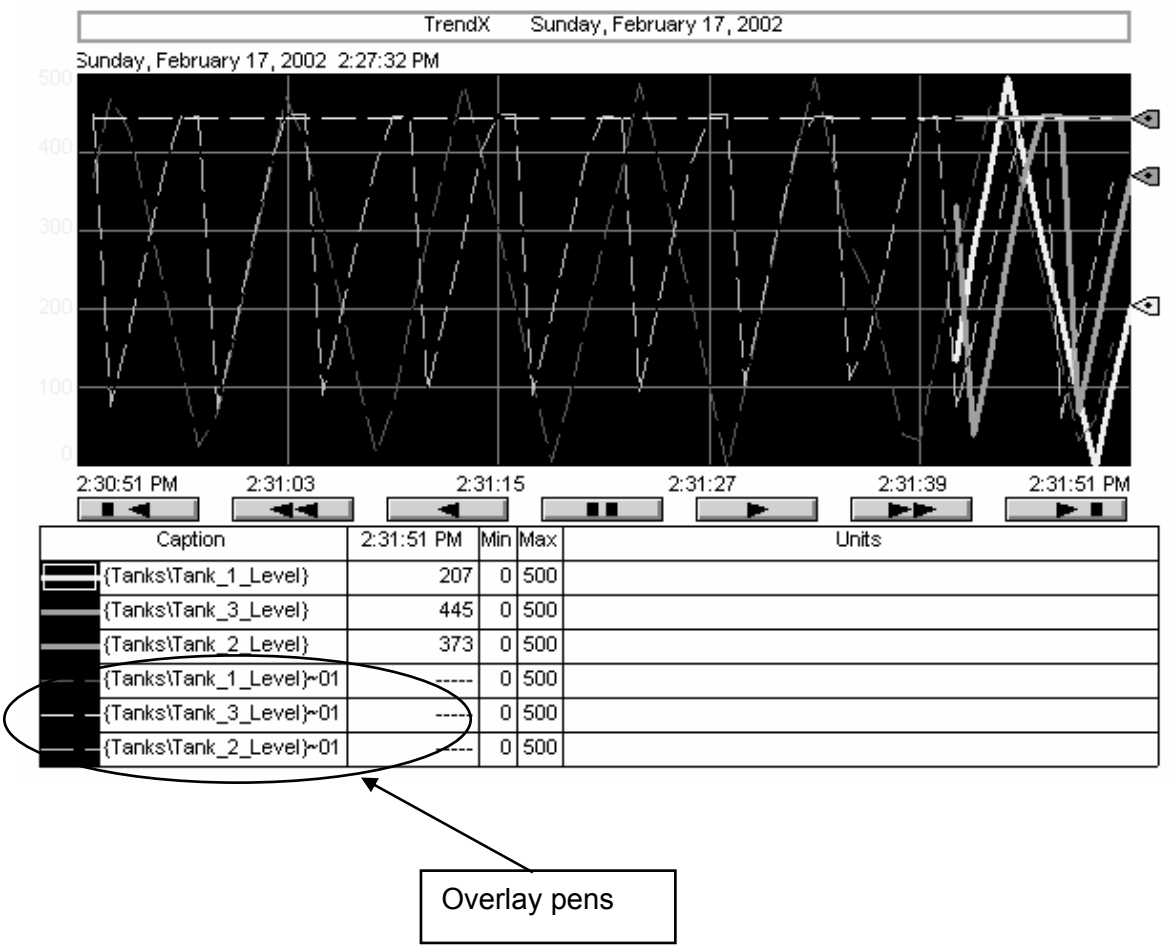
Trend Snapshots are kept in the Graphics folder of the Application Explorer



To overlay a snapshot on the Trend

1. Open the TrendX property tabs and then click the Overlays tab.
2. Click the Add button and select a snapshot name.

All of the snapshots that you add to the Trend can be available for operators to either show or hide on the run time chart from the context menu. (Set up run time options on the Runtime tab.)



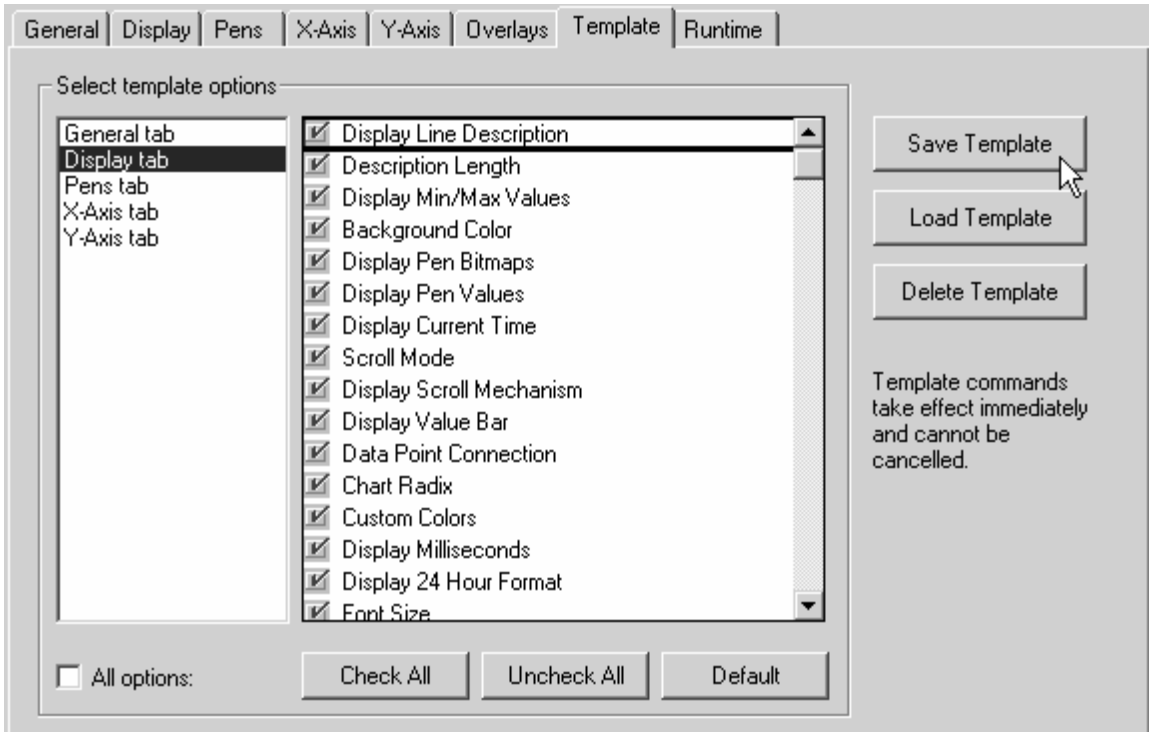
Creating Trend Templates

Templates allow you to save the display options for a Trend, and then apply those options to other trend charts for a consistent appearance. Templates are also a good way to create a set of different views of the same data, or a quick way to return to a standard display after experimenting with display options.

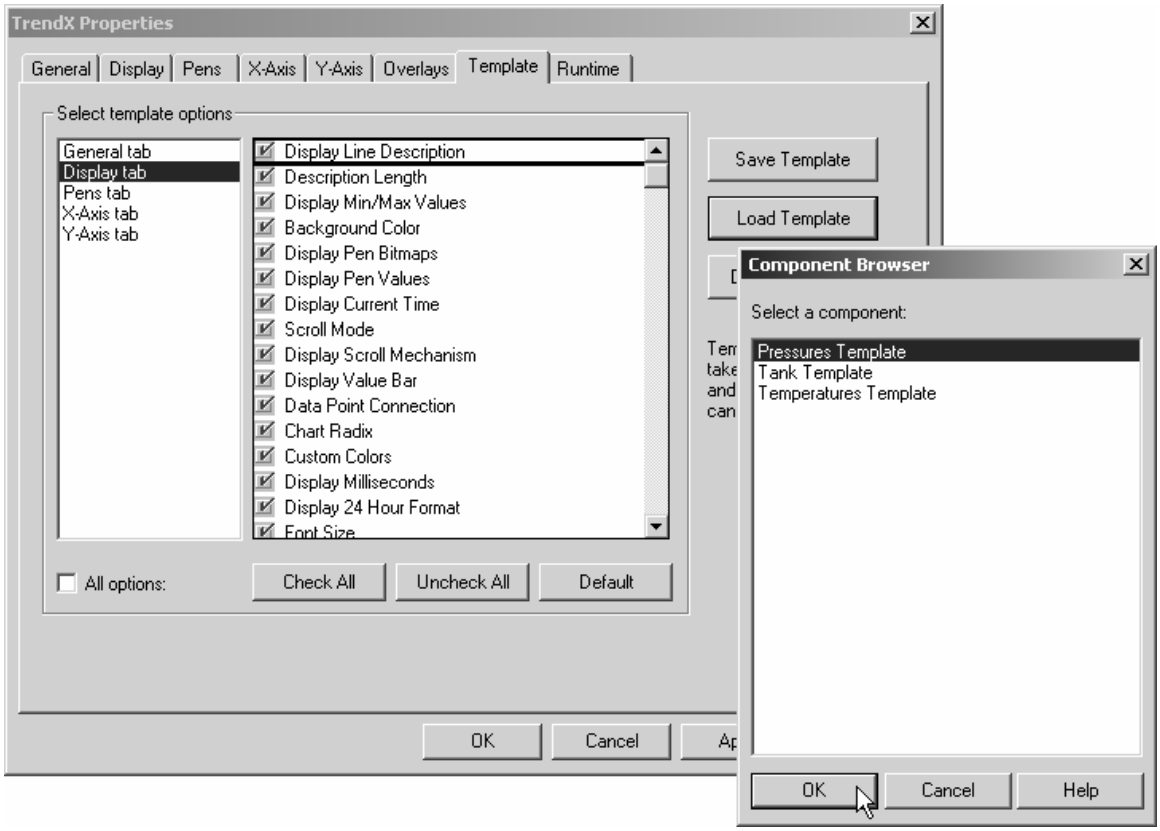
To create and save a new template

1. Use the General, Display, Pens, X-Axis and Y-Axis tabs to specify the display options and pen attributes to be captured in a template.
2. On the Template tab, specify which of the set up options should be applied to a trend chart when the template is loaded.

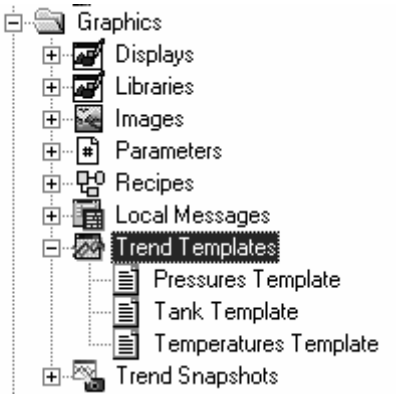
   On the left side of the options box, click a property tab to select it. On the right side of the box, select the specific options available from that tab to load with the template. Clear the check boxes for those options that should not load with the template.
3. Click the Save Template button. Type a name for the template and then click OK. The new template is saved immediately; it is not necessary to click OK or Apply on the property tab.



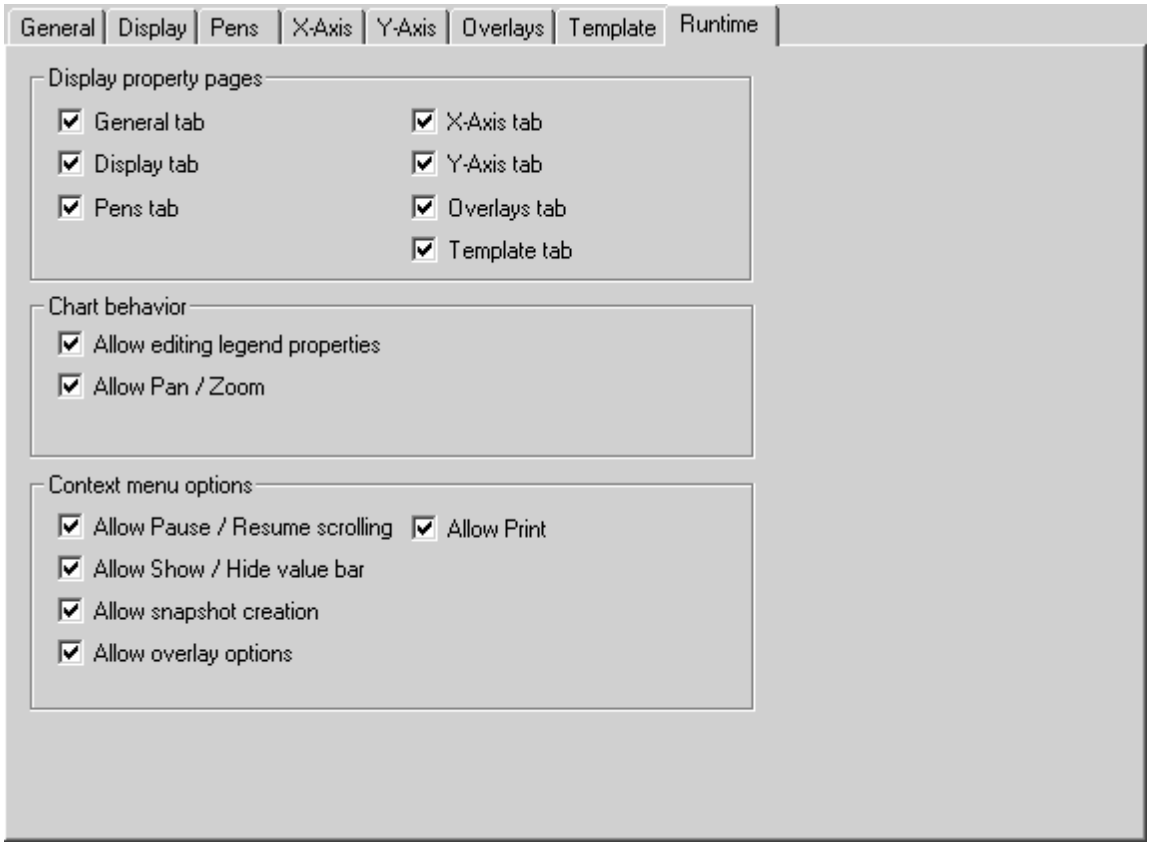
Open the trend properties Template tab and select **Load Template** to use a saved template.



The trend templates are shown in the Graphics tab of the Application explorer:



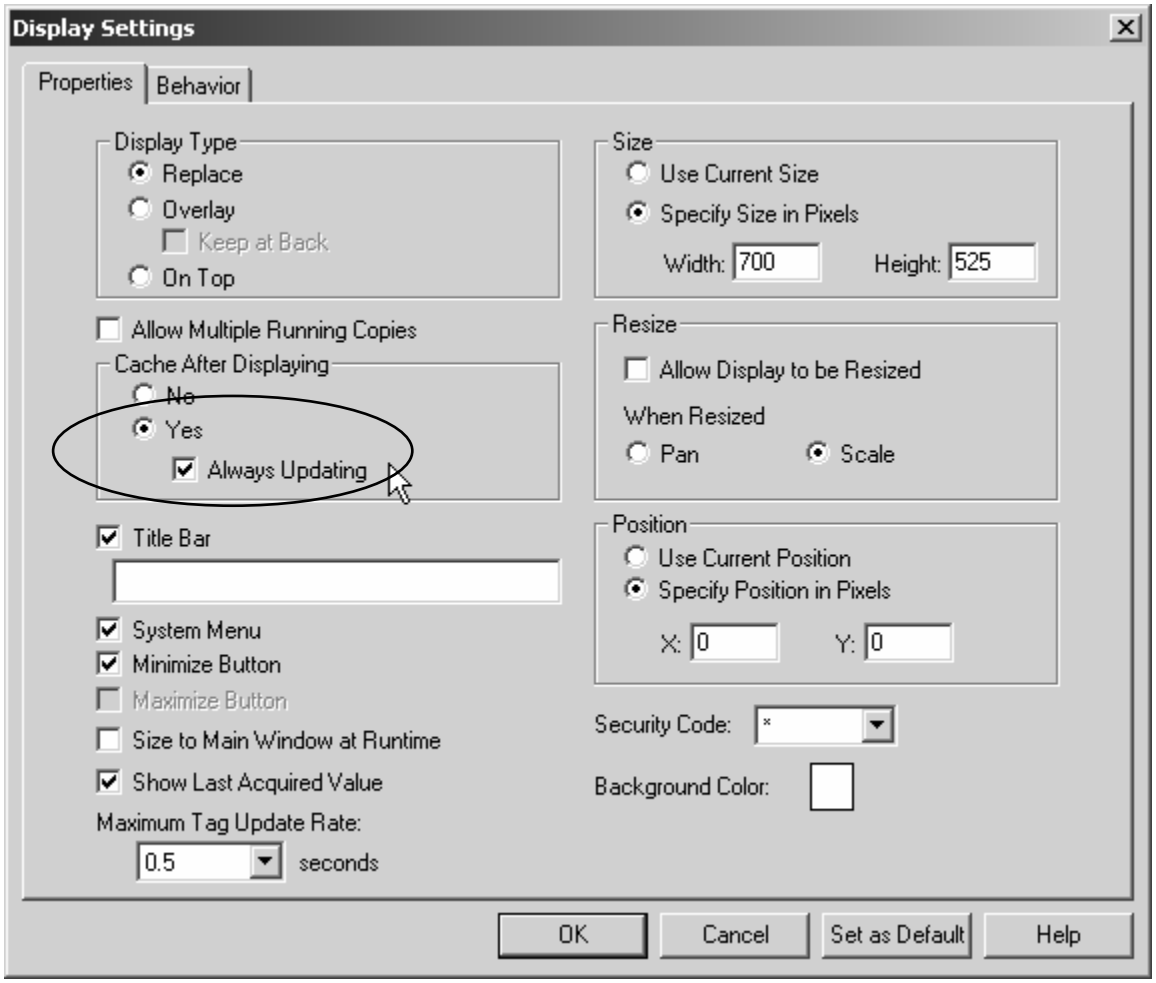
Runtime Tab



Use the TrendX properties - Runtime tab to determine which TrendX options are available to operators during run time. To prevent operators from changing these options, the Runtime tab is not available during run time.

Trends will automatically start over when their graphic display is shown. If you wish to have the trend continually collect and display data regardless of whether the display is showing, change a setting in the graphic display settings.

Force the display to be saved in memory by selecting **Yes** in the **Cache After Displaying**. In addition, check **Always Updating** to force the trend object to stay up-to-date.



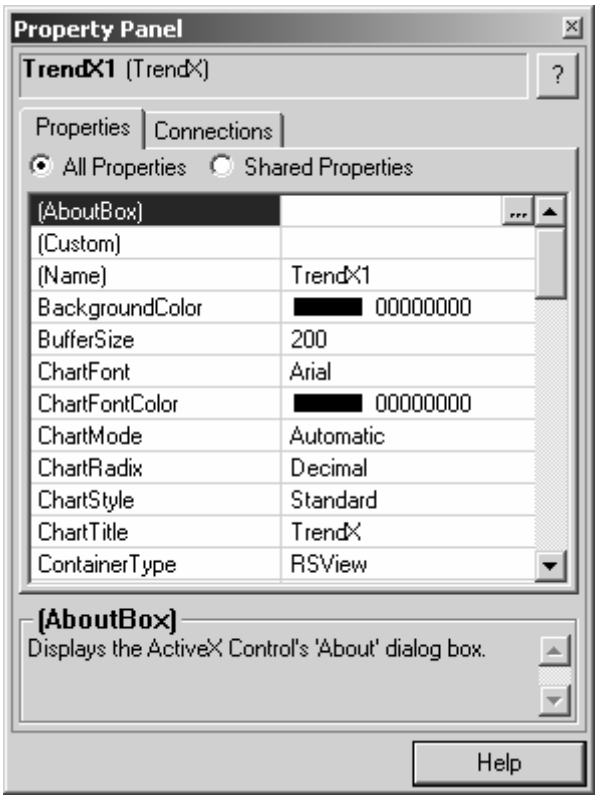
The TrendX Object Model

The RSView trend object is an ActiveX control called TrendX. You can interact with ActiveX controls trough their:

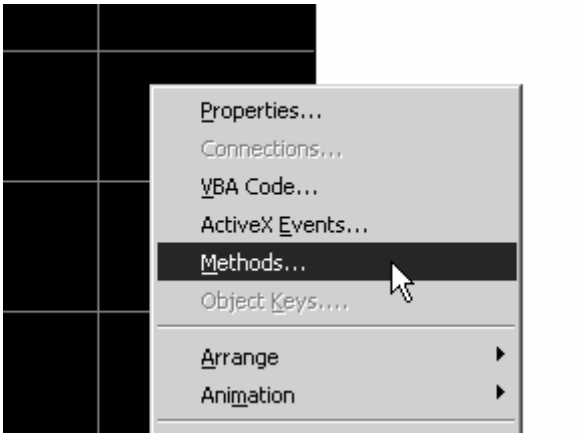
- properties - named characteristics and values of an object such as Value, Enabled, and Caption.
- methods - functions implemented in an ActiveX object that allow external actions to change the object's appearance, behavior or properties. A call to a method might be made in response to events from other objects and could trigger other events. In RSView you can use the Invoke command as the external event that calls a method.
- events - actions triggered by an ActiveX object in response to an external action on the object such as a mouse click. In RSView, you can use events to change the value of a tag or run an RSView command or macro. When the event occurs, the command or macro is run. You can also receive parameter values from an event by assigning event parameters to tags.

Reference the TrendX help documentation for complete definition and examples of the TrendX properties, methods and events.

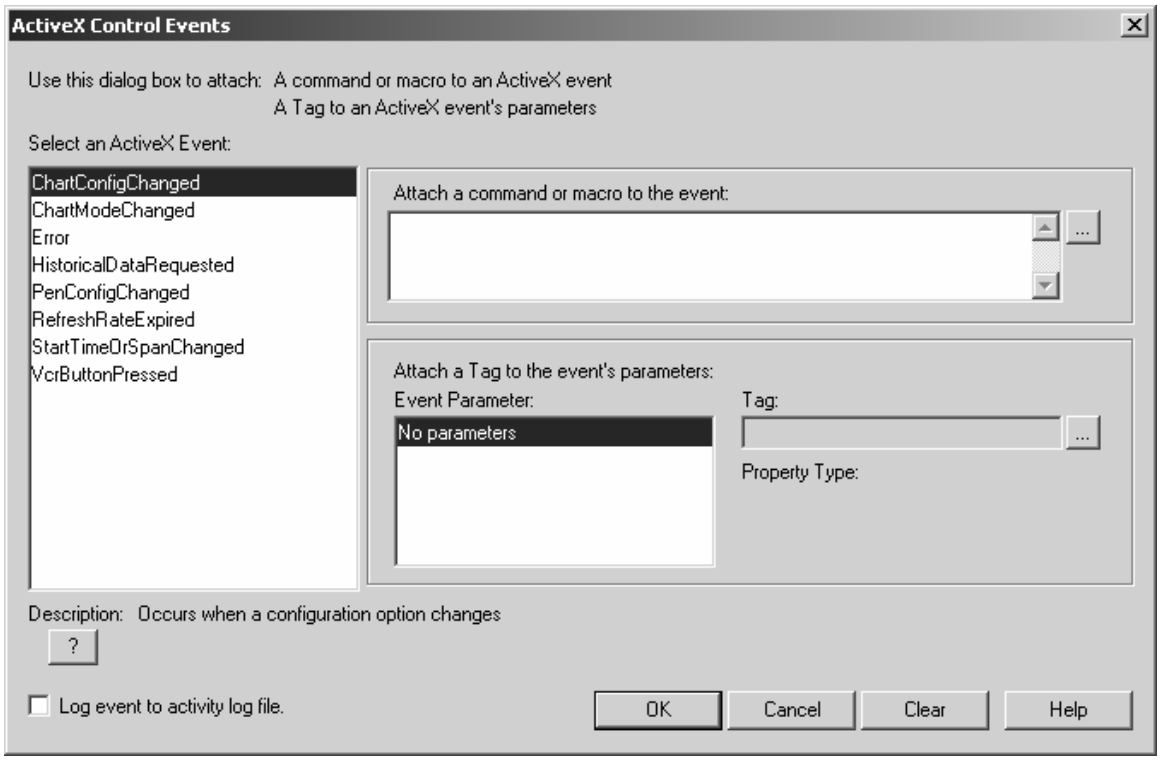
Open the Property Panel to see the available properties:



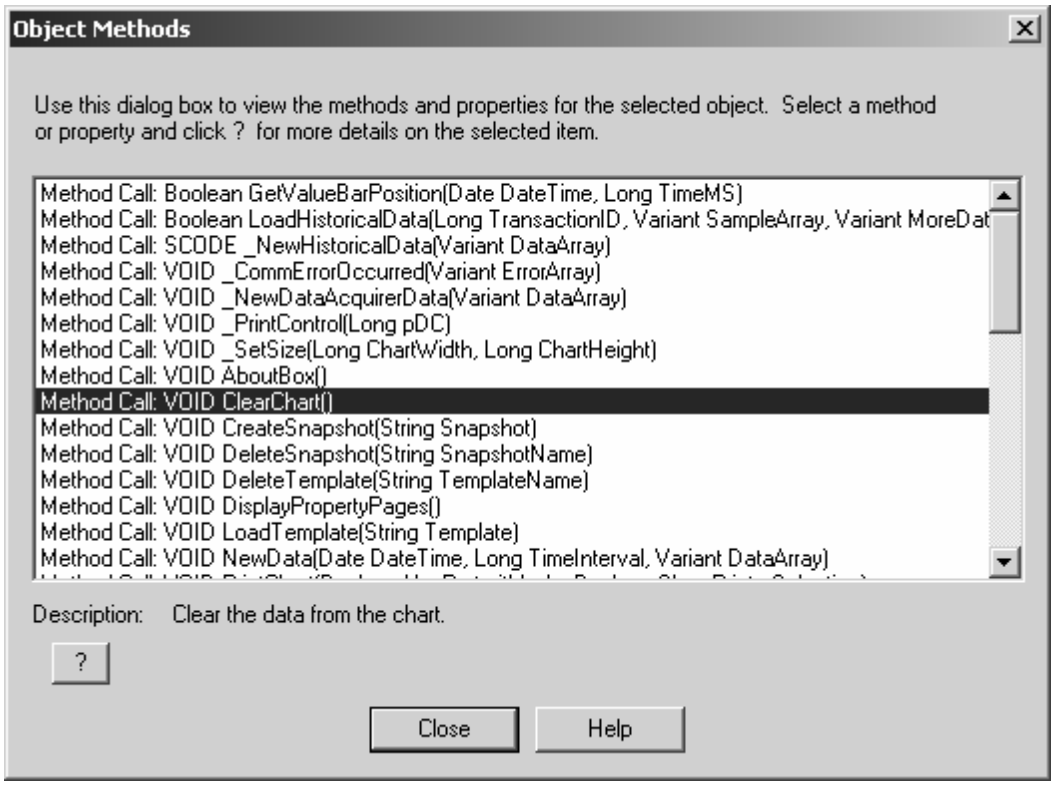
Right-click on a trend to see the Events and Methods:



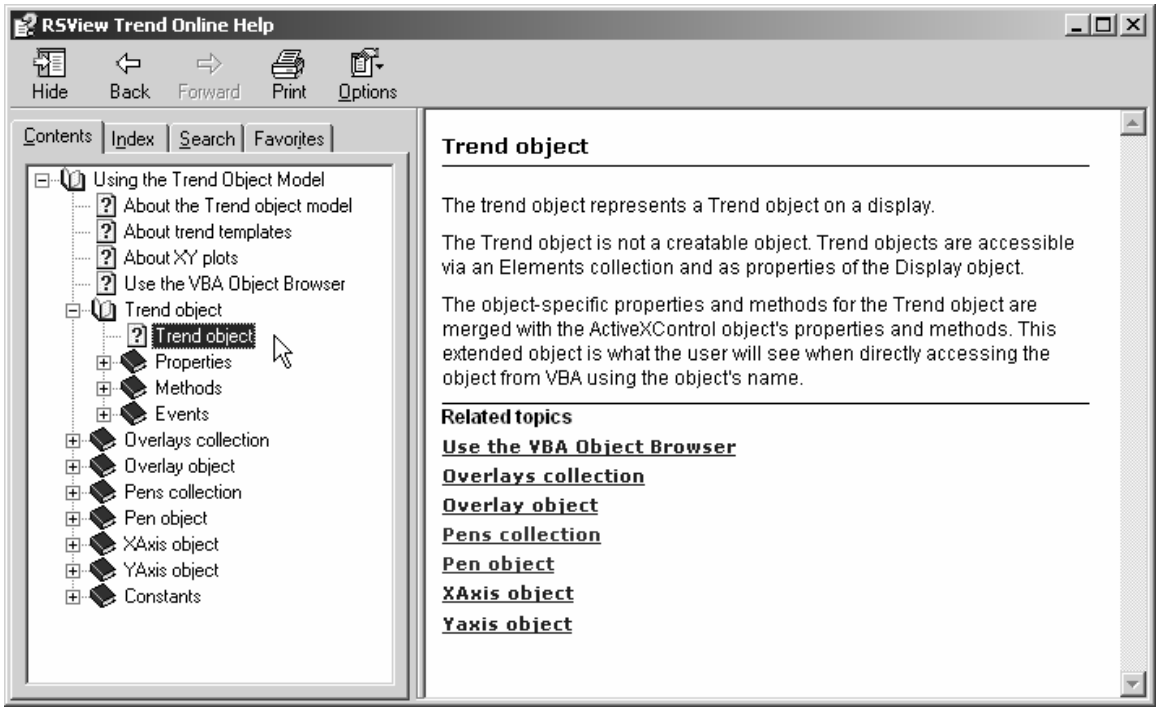
TrendX Events allow you to run a command whenever a defined event occurs. For example, you could run a command to log a message to the Activity Log whenever the Pen Configuration changes.



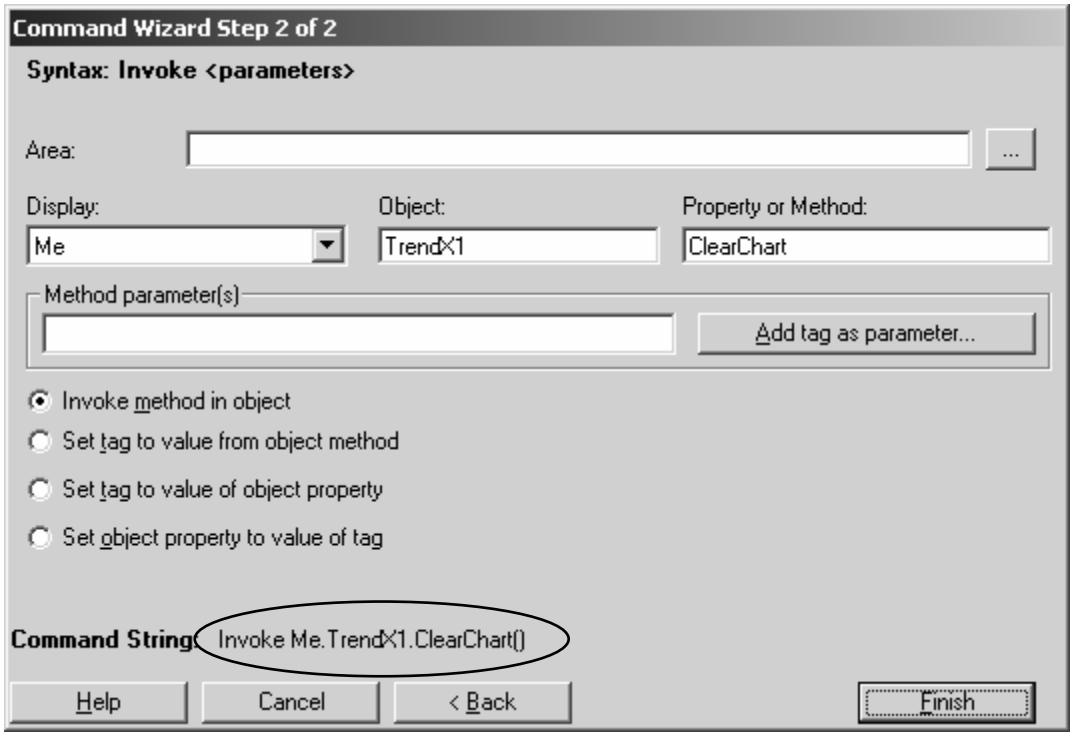
TrendX methods are shown in the Object Methods dialog box.


Object Methods
Use this dialog box to view the methods and properties for the selected object. Select a method or property and click ? for more details on the selected item.
Method Call: Boolean GetValueBarPosition(Date DateTime, Long TimeMS)
Method Call: Boolean LoadHistoricalData(Long TransactionID, Variant SampleArray, Variant MoreDat
Method Call: SCODE _NewHistoricalData(Variant DataArray)
Method Call: VOID _CommErrorOccurred(Variant ErrorArray)
Method Call: VOID _NewDataAcquirerData(Variant DataArray)
Method Call: VOID _PrintControl(Long pDC)
Method Call: VOID _SetSize(Long ChartWidth, Long ChartHeight)
Method Call: VOID AboutBox()
Method Call: VOID ClearChart()
Method Call: VOID CreateSnapshot(String Snapshot)
Method Call: VOID DeleteSnapshot(String SnapshotName)
Method Call: VOID DeleteTemplate(String TemplateName)
Method Call: VOID DisplayPropertyPages()
Method Call: VOID LoadTemplate(String Template)
Method Call: VOID NewData(Date DateTime, Long TimeInterval, Variant DataArray)
Description: Clear the data from the chart.
?
Close
Help

Method details are also in the Help system:



TrendX (and any ActiveX control) properties and methods may be executed by running the RSView **`invoke`** command. For example, you may wish to clear the trend when a button is pushed. Execute the `invoke` command and reference the `ClearChart` method.



You may also access the TrendX object model (properties, methods, events) with Visual Basic for Application. VBA within RSView will be covered in a later chapter.

Lab 10 – Trending

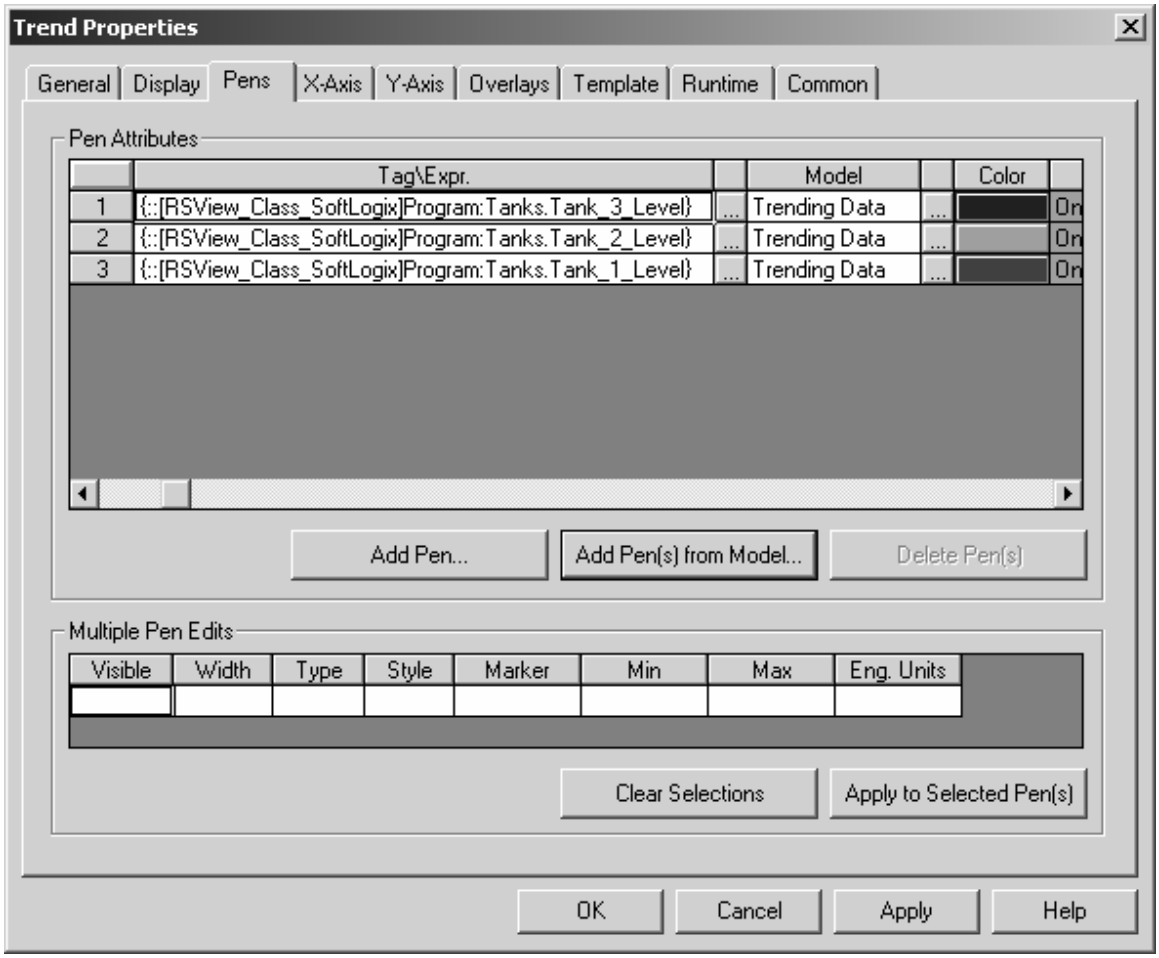
Objective: In this lab, you will create a trend graphic to show real-time and historical data.

Software Requirements:

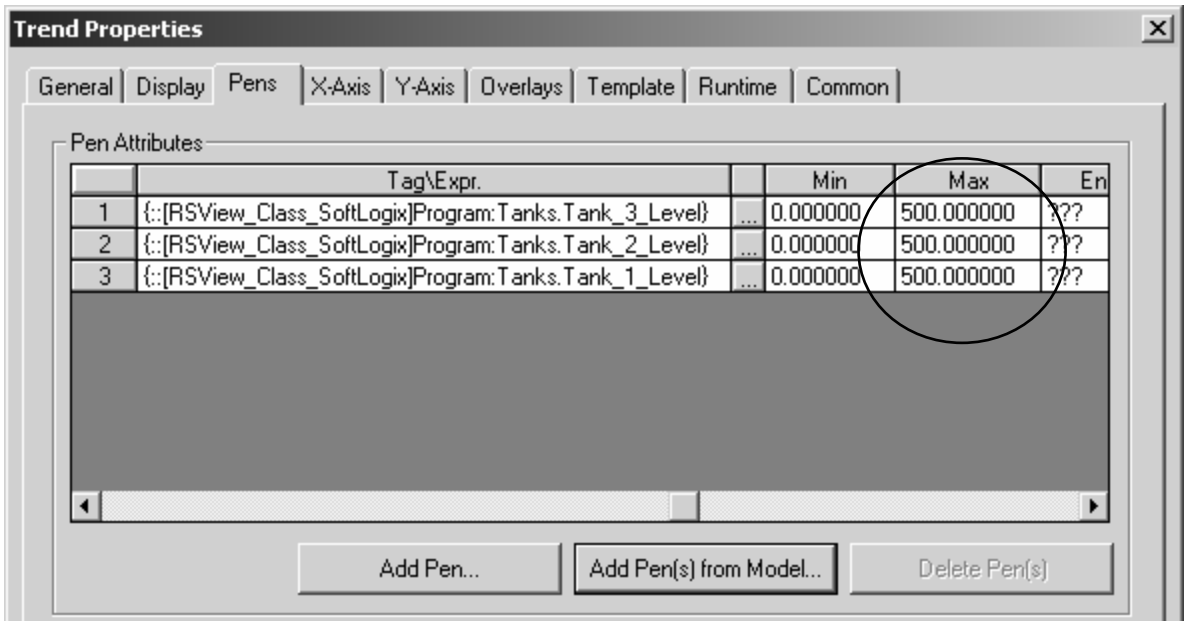
- RSView Studio
- SoftLogix 5860 running RSView_Class_SoftLogix program

1. Create a new graphic

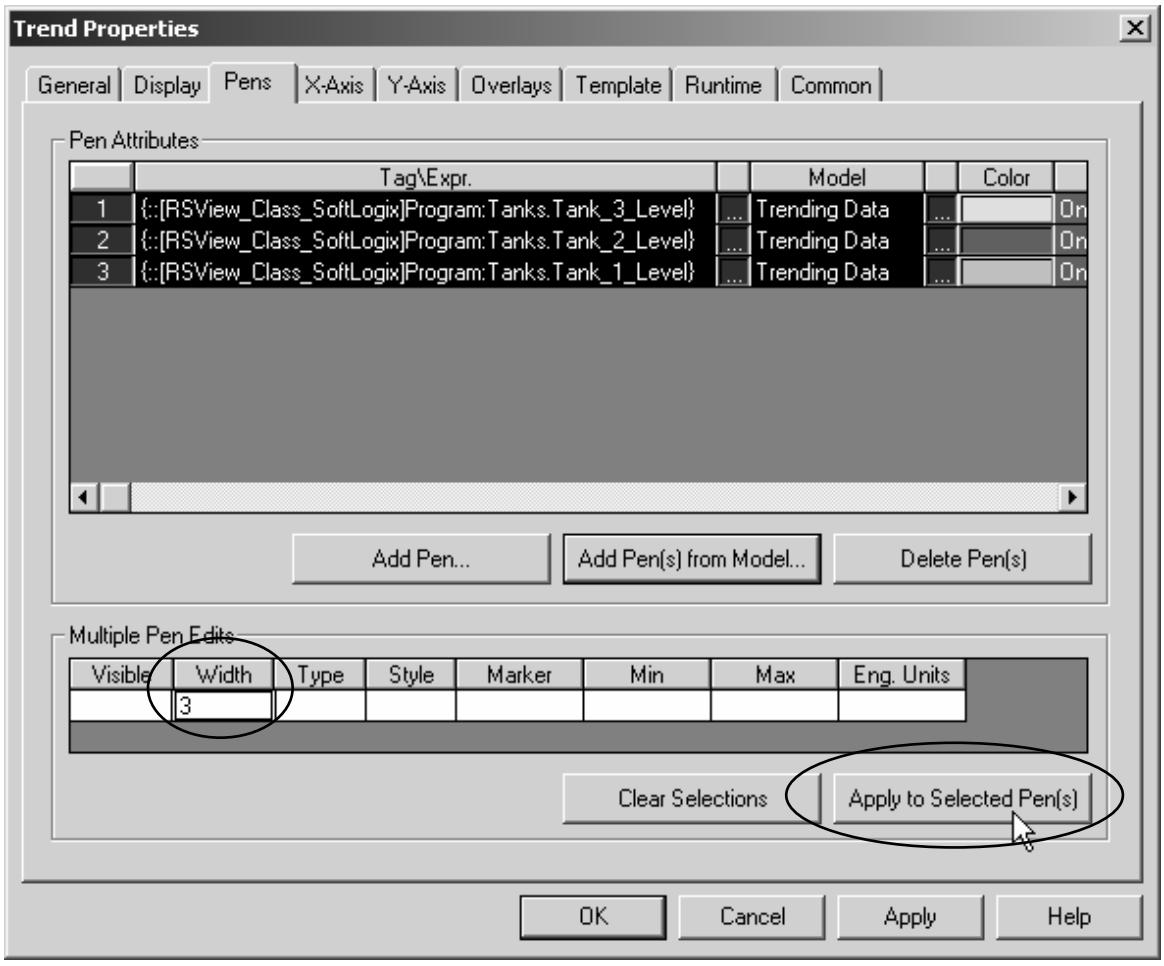
- Open a new graphic display. Select the **Trend** object and draw a trend out on the upper part of the graphic.
- Double-click the trend to configure it.
    a) Select the Pens tab. Click **Add Pens from Model**. Select the **Trending Data** model and choose the Tank Level tags:



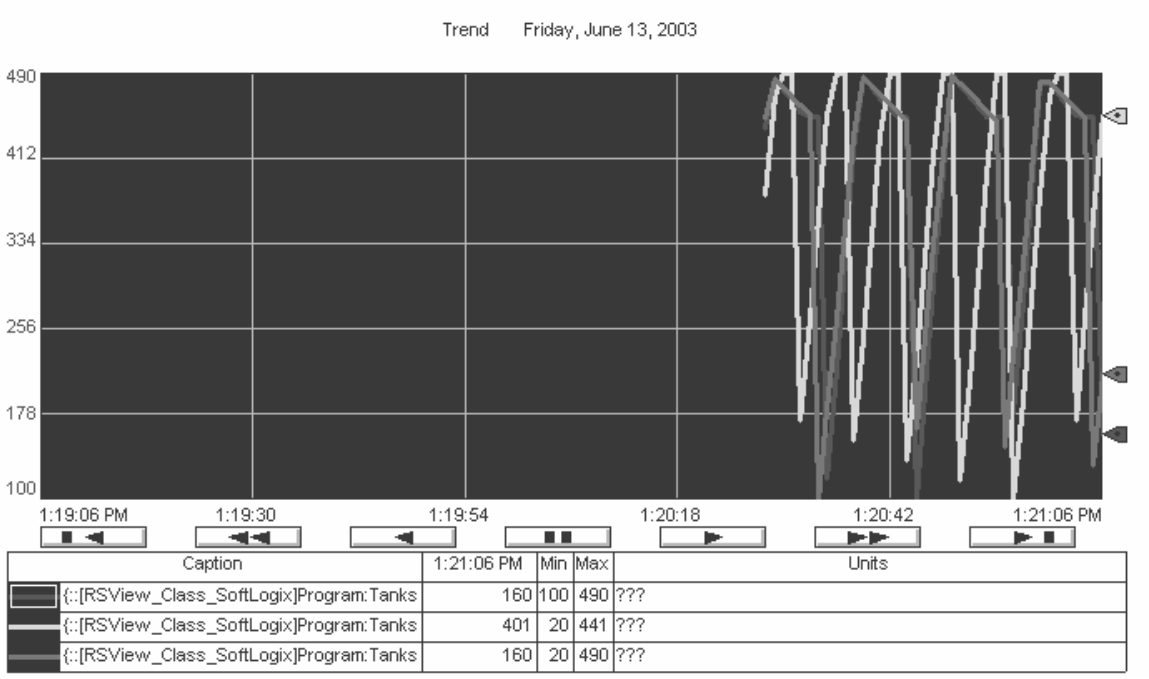
b) Scroll to the Max fields for each pen and enter 500.



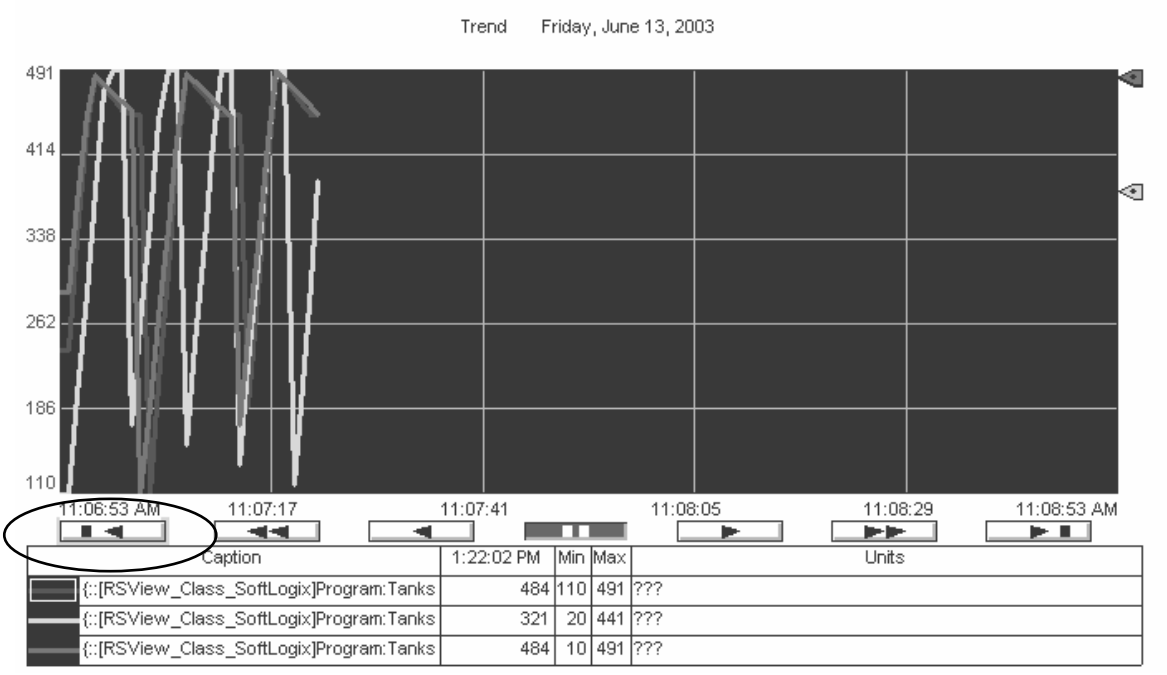
c) Select all three pens in the upper window. Change their line width to 3 by using the **Multiple Pen Edits** tool:



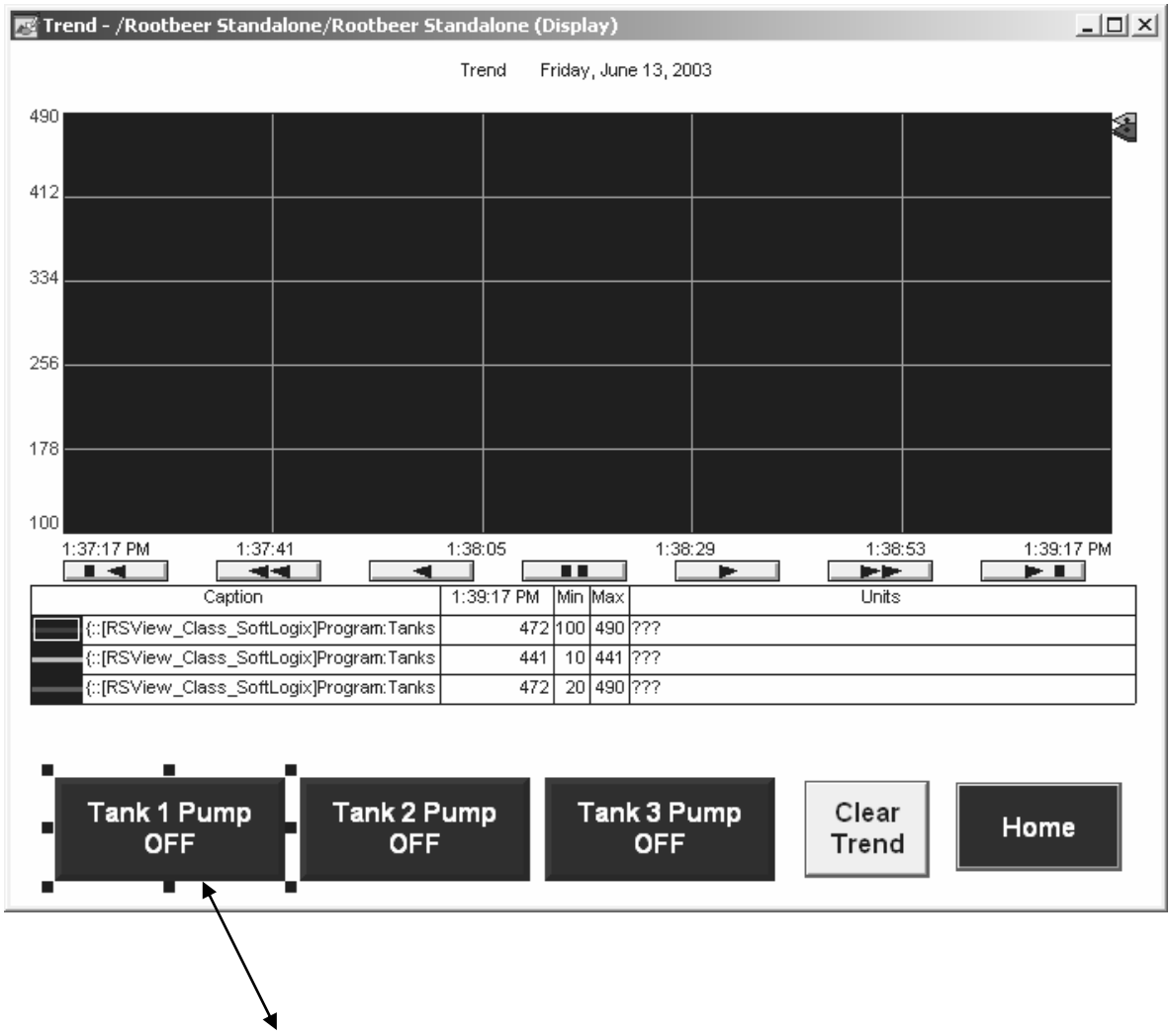
- Test the display to see real-time data:

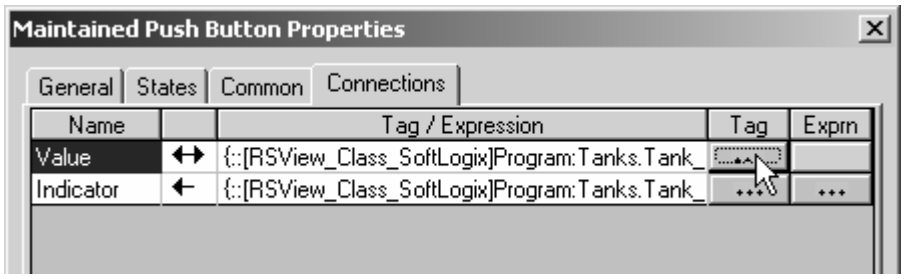


- Click on the **Oldest Data** button and see the historical data collected from a previous lab. (Go back and collect data if you hadn't done so before.)



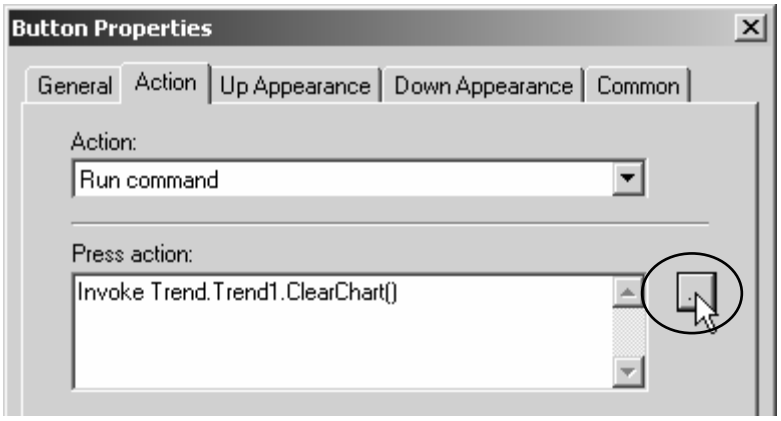
- Add to the graphic display
    a) Add three Maintained pushbuttons to control the tank pumps





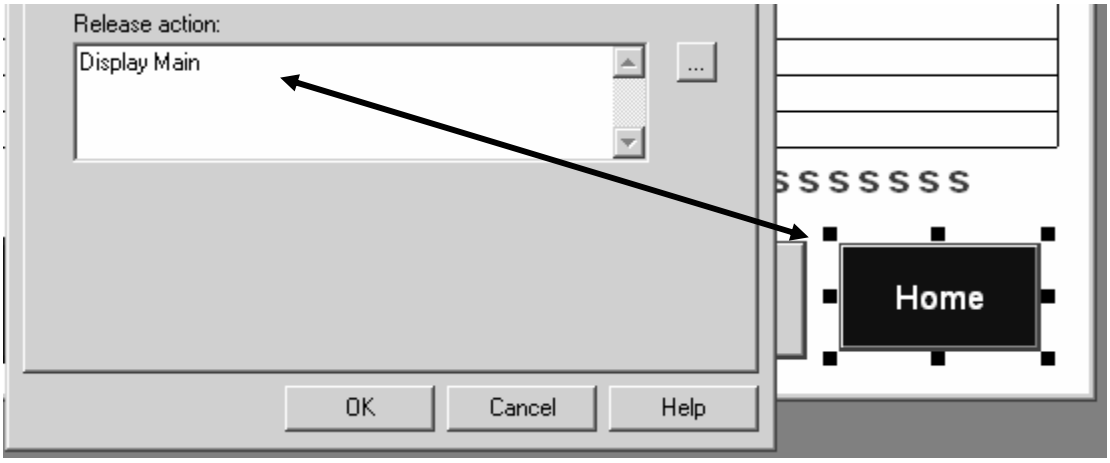
Use the Pump tag
`[RSView_Class_SoftLogix]Program:Tanks.Tank_1_Pump`
for both Value and Indicator fields.

b) Add a Button to clear the chart. Use the `invoke` command:

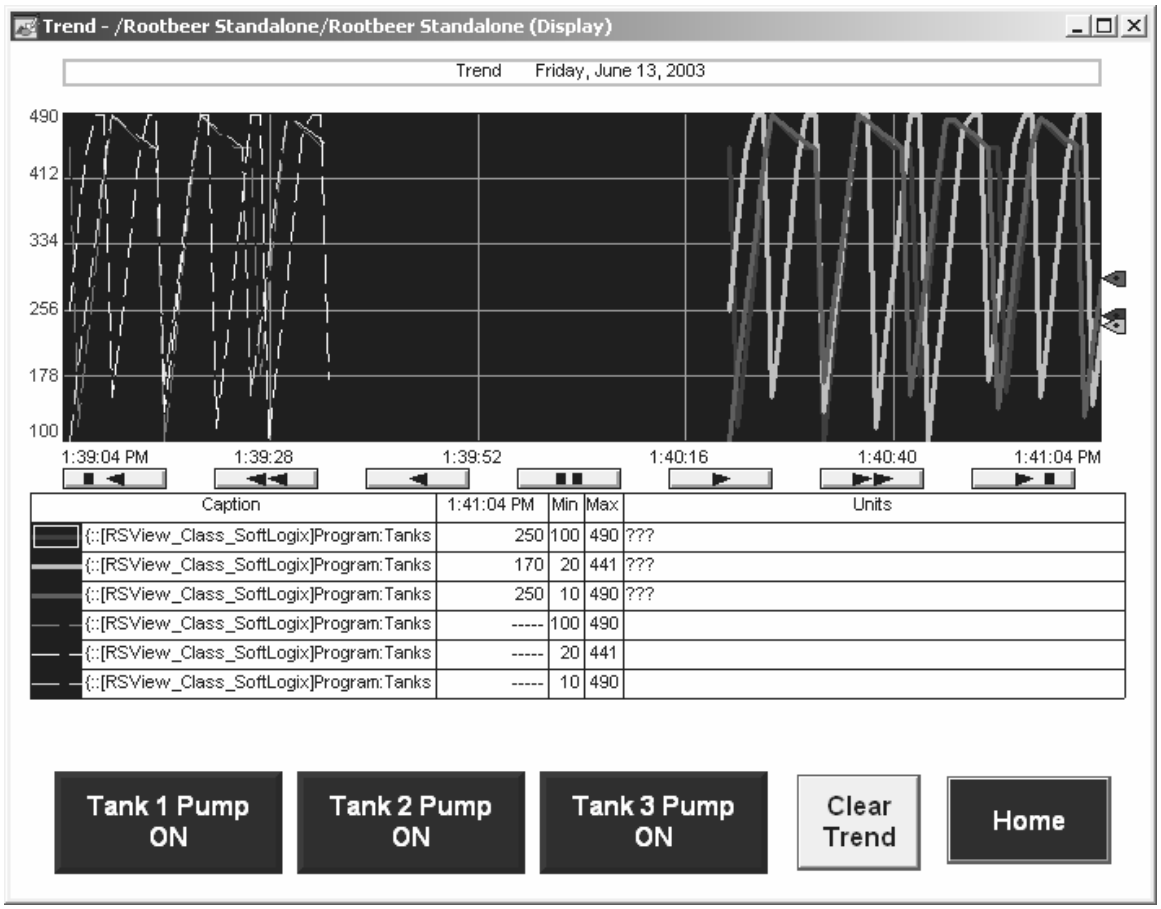


Make sure the name of the object is correct in your command. The trend object above is **Trend1**.

c) Add a Button with a caption of "Home" to display a graphic called **Main**. The graphic doesn't exist yet. You may copy the button from the Alarms graphic if you wish.



- Create a snapshot and overlay.
    a) Right-click on the trend after is has been running for a while. Select **Create Snapshot**. Save the snapshot with the name **Levels**.
    b) Right-click on the trend again. Select **Chart Properties**. Add the **Levels** snapshot in the **Overlays** tab.



This Lab is Finished.

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10. *Derived Tags and Event Files*

Objectives:

- Define Derived Tags
- Configure a Derived Tag file
- Start and Stop a Derived Tag file
- Describe how to automate tasks by using an Event file
- Configure an Event file
- Start and Stop an Event file
- Configure the update rate for Derived Tag and Event files

Derived Tags

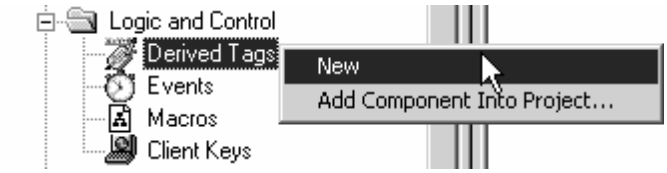
A derived tag is an analog, digital, or string HMI tag whose value is determined through the evaluation of an expression. An expression can be simply a tag name or it can be an equation made up of tag names, mathematical and logical operations, special functions and If-Then-Else logic. The current value of a derived tag is written to the tag's data source.

A derived tags file consists of a number of derived tags and a maximum update rate for them. At runtime you can have multiple derived tag files active at once (up to 20 derived tag files, each containing up to 1000 derived tags).

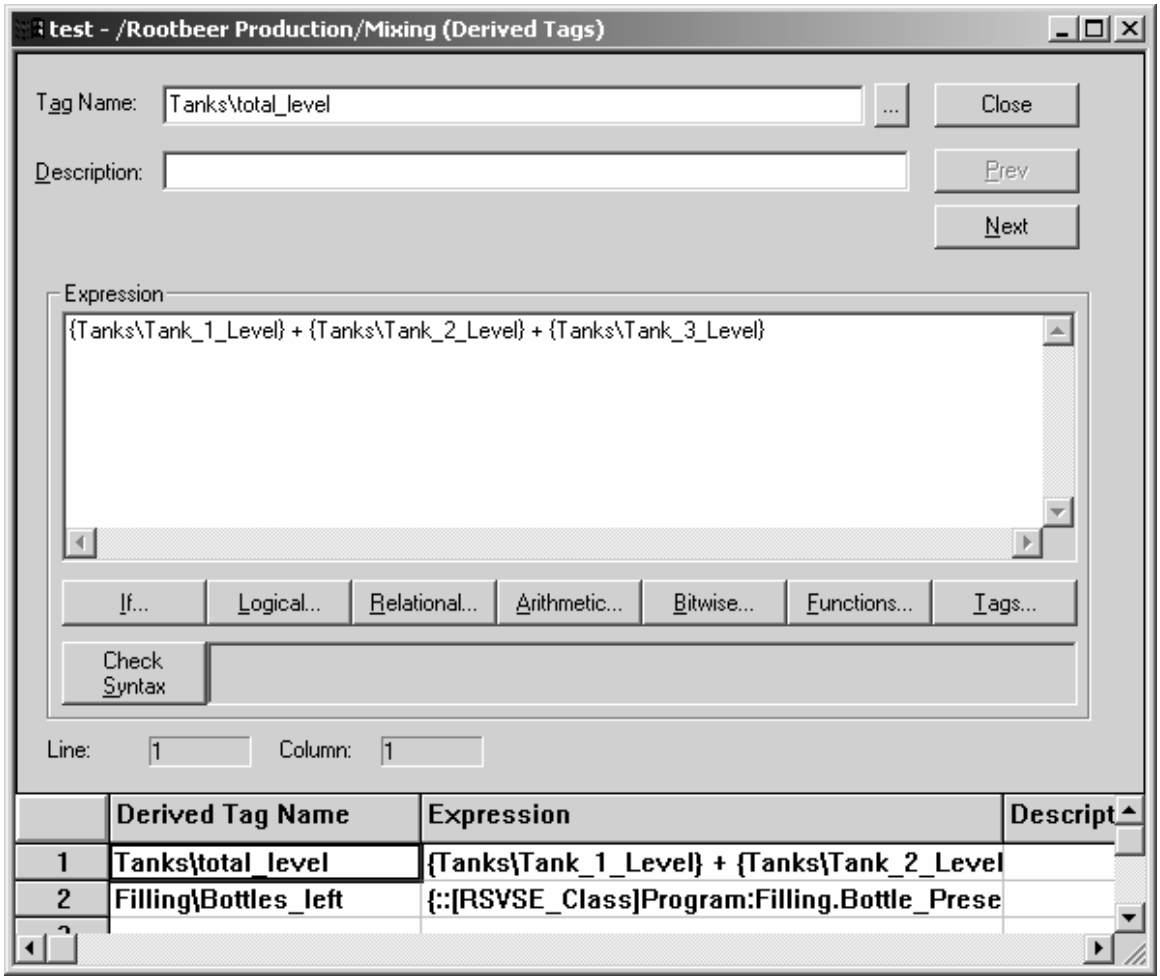
You should not write to derived tags, because they are only evaluated when the expression changes. For example, if a derived tag, tag3, has the expression tag1 + tag2, and if you set tag3 = 0, the value of tag3 becomes zero, and will only be updated when the value of tag1 or tag2 changes.

Derived tags are evaluated asynchronously. Therefore, don't use a derived tag in the expression of another derived tag – there is no guarantee that one is evaluated before the other.

Create a derived tag file from the **File, New** menu, or by right-clicking the **Derived Tags** icon in the Application Explorer's HMI Project.



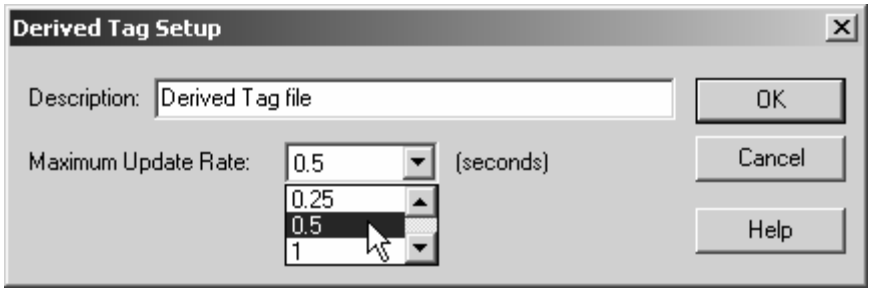
The Derived Tag Editor consists of a form view on top, and a spreadsheet view to display the configured tags.



Browse for a tag in the Tag Name field. This will be an HMI tag with **memory** as its data source.

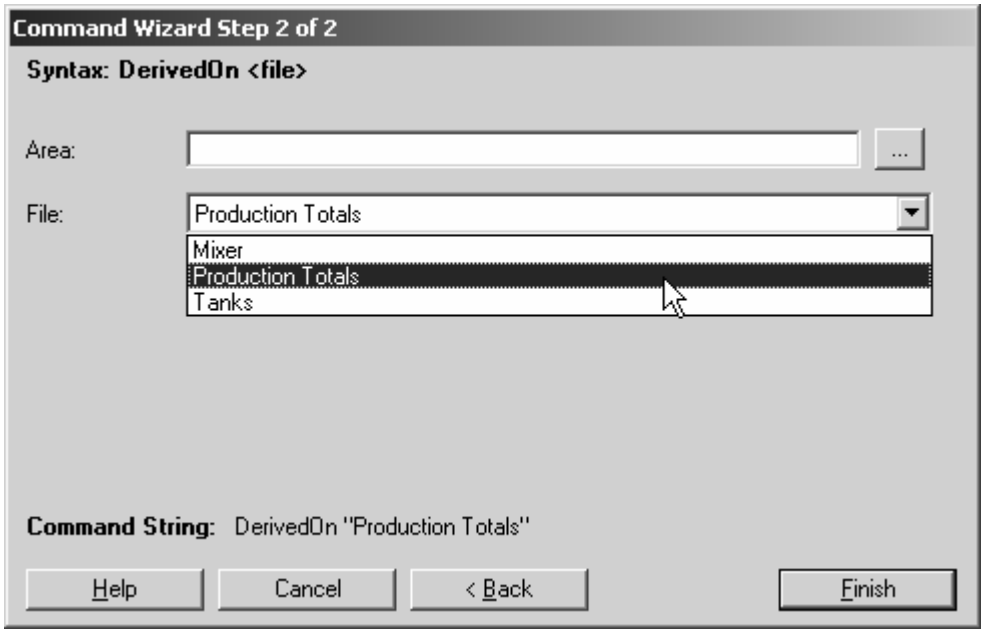
Create an expression to define the tag. See page 5-29 for more details on the expression editor.

The derived tag file will be evaluated by RSView according to the settings in the **Setup** menu. The default evaluation rate is 0.5 seconds.



Running a Derived Tag File

Issue the `DerivedOn` command to start a derived tag file.



One derived tag file may be started automatically by specifying it the **Startup** editor.

Stop a derived tag file by issuing the `DerivedOff` command.

Event Files

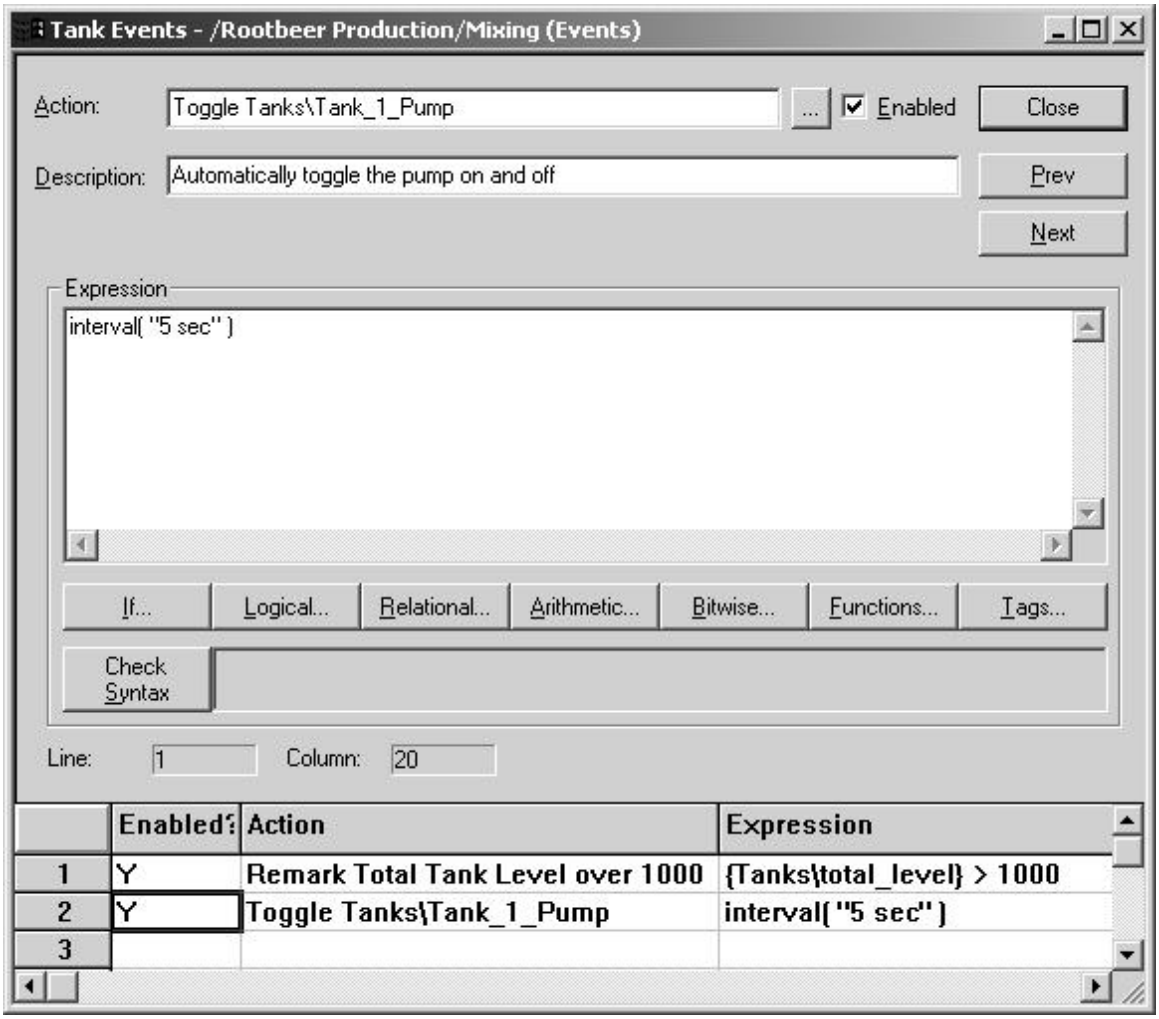
An event is an action that is triggered by the evaluation of the expression associated with it. The action can be any RSView command or macro. When the expression changes from false on the previous evaluation to true on the current evaluation, the action is triggered. An expression can be simply a tag name or it can be an equation made up of tag names, mathematical and logical operations, special functions, and If-Then-Else logic.

Use Event files to automate your RSView project. For example, the Event file may continuously monitor whether any tags have gone into an alarm state, and when one has, take an action such as displaying an alarm graphic. Or it may monitor the system clock, and automatically issue a command at a particular time of day.

An events file consists of a number of events and a maximum update rate for them. At runtime you can have multiple events files active at once (up to 20 events files, each containing up to 1000 events).

Create an event file from the **File, New** menu, or by right-clicking the **Events** icon in the Application Explorer's HMI Project.

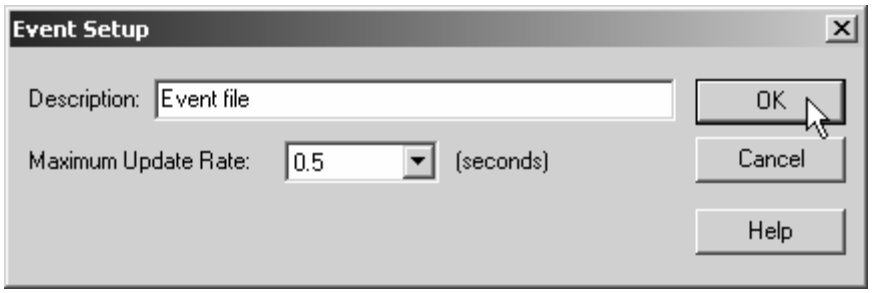
The Event Editor consists of a form view on top, and a spreadsheet view to display the configured events.



Select an RSView command (or macro) for the Action field.

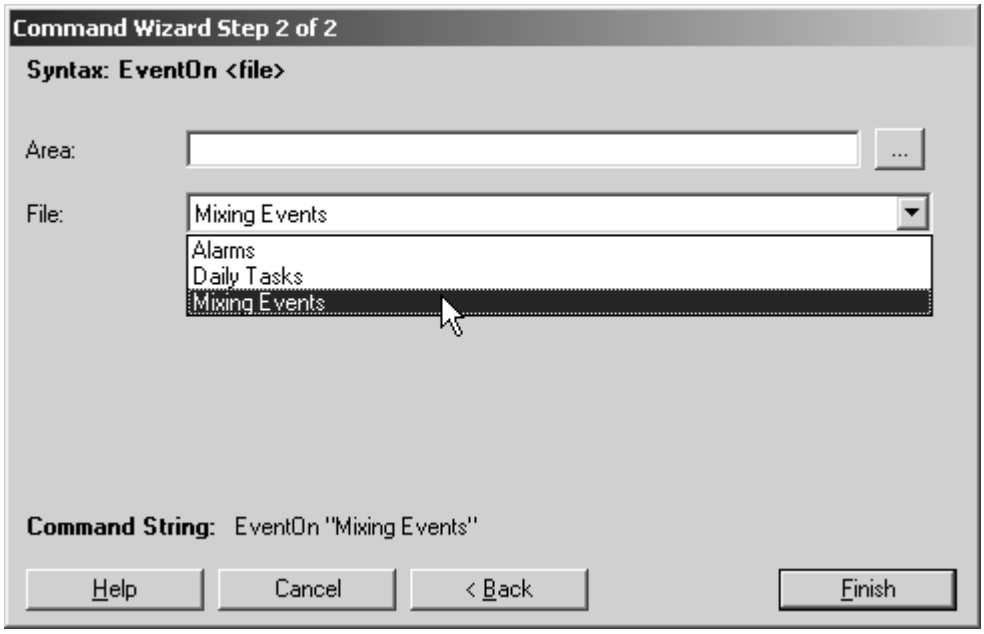
Create an expression to trigger the action. See page 5-29 for more details on the expression editor. The action will occur upon a **false-to-true transition** of the expression.

The event file will be evaluated by RSView according to the settings in the **Setup** menu. The default evaluation rate is 0.5 seconds.

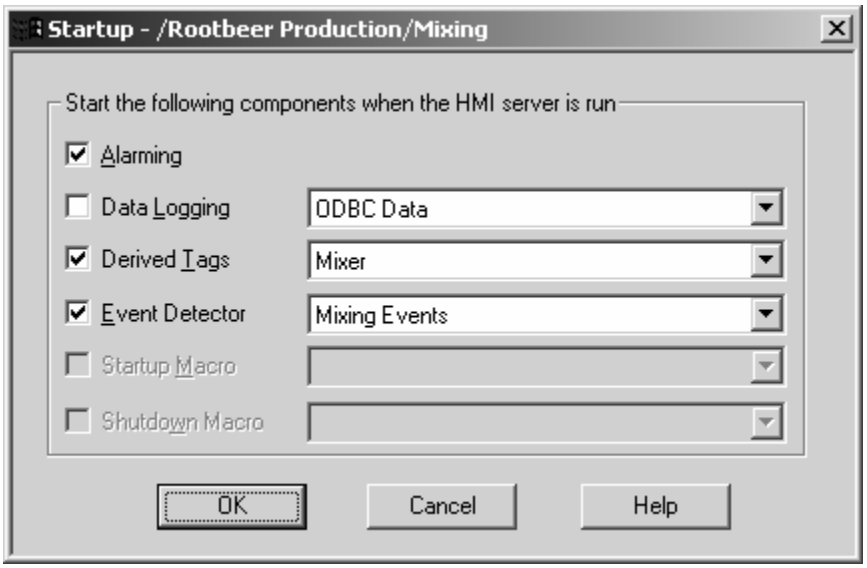


Running an Event File

Issue the `EventOn` command to start an event file.



One event file may be started automatically by specifying it the **Startup** editor.



Stop a derived tag file by issuing the `EventOff` command.

Lab 11 – Derived Tags and Event Files

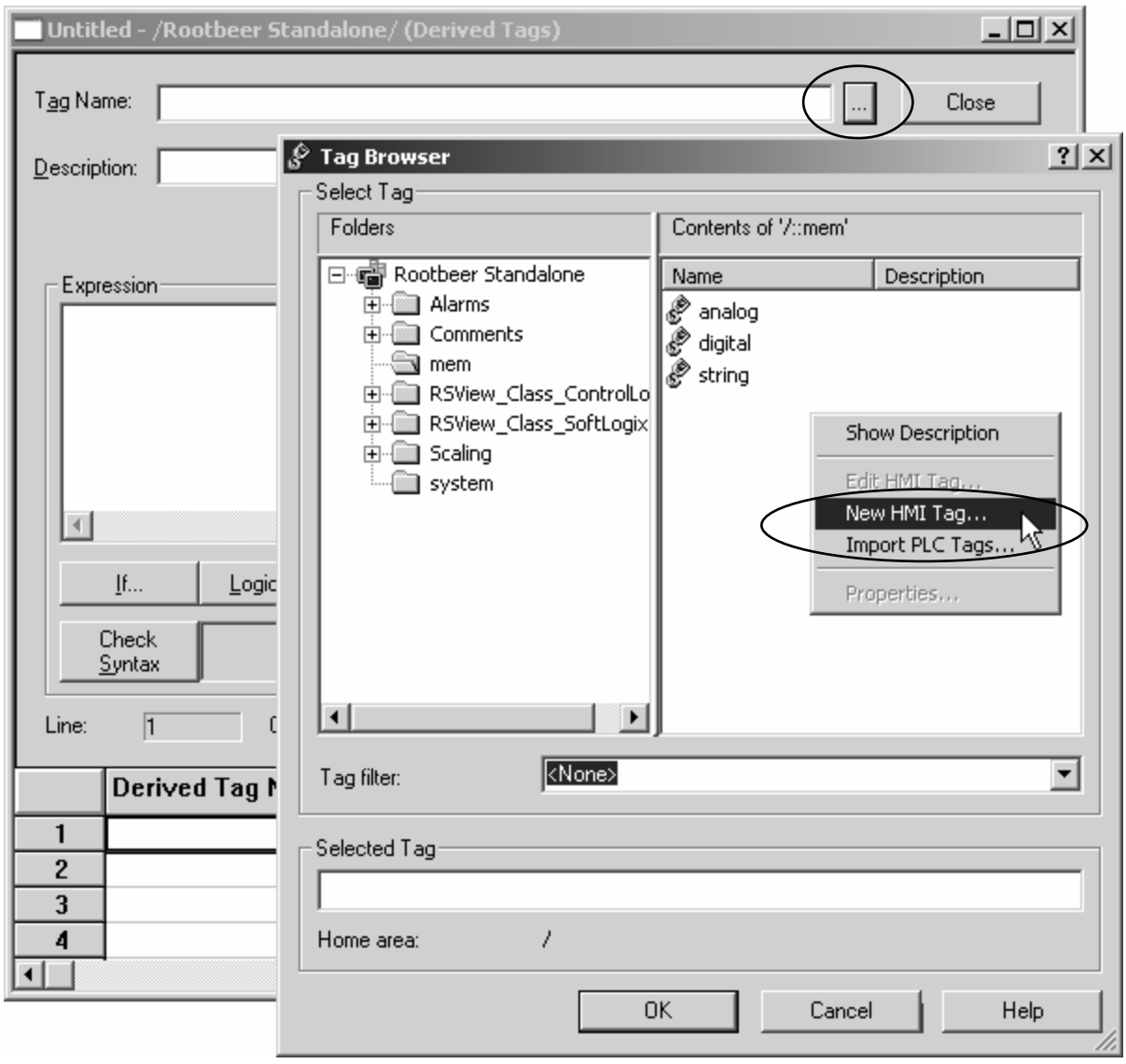
Objective: In this lab, you will create a derived tag file and an event file. The derived tag file will perform some math functions on existing tags. The event file will automate an entry into the Activity Log.

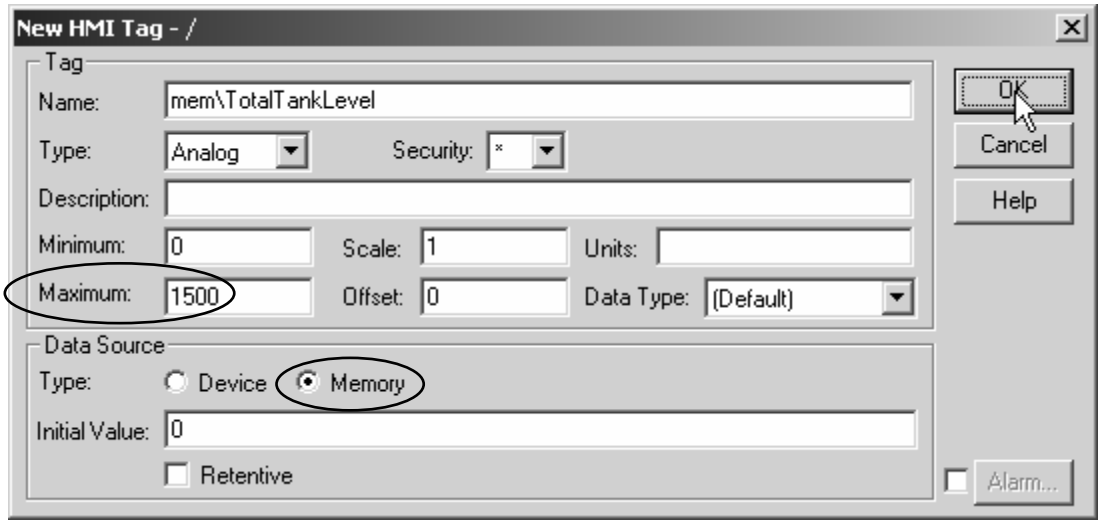
Software Requirements:

- RSView Studio
- SoftLogix 5860 running RSView_Class_SoftLogix program

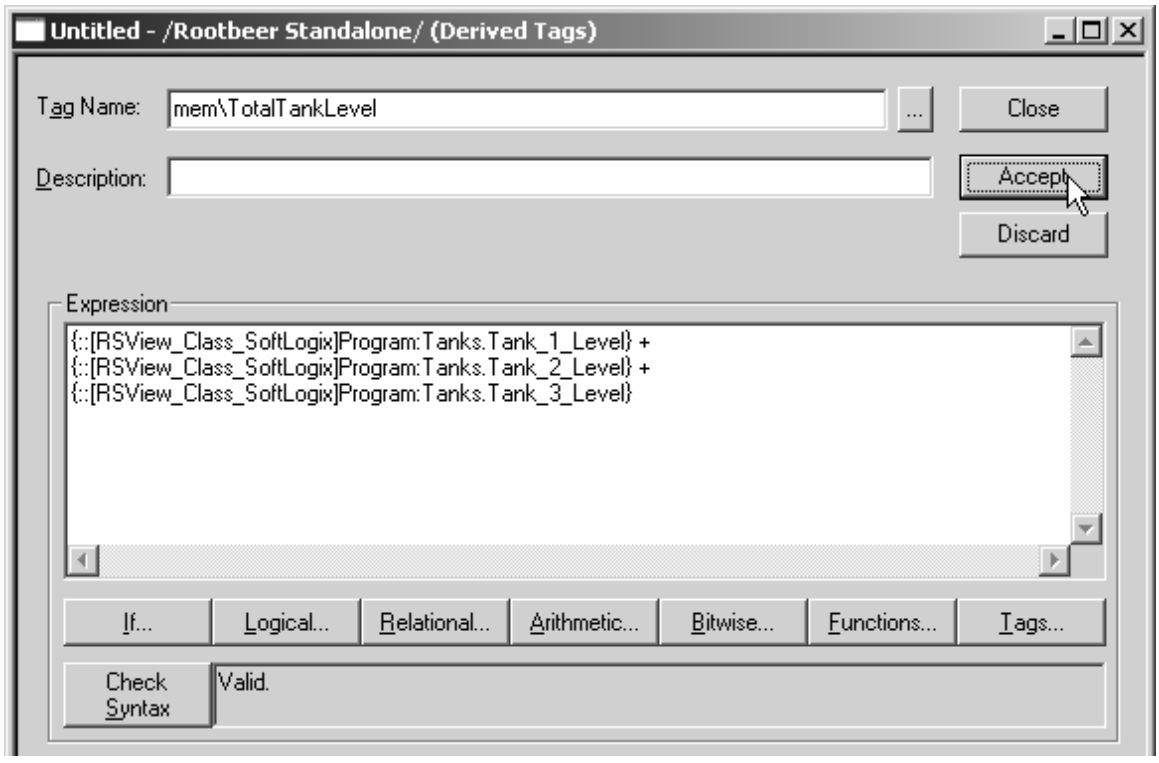
1. Create a new derived tag file

- Open a new derived tag file. Bring up the tag browser and double-click the **mem** folder to open it. Right-click in the right pane and create a new tag called **TotalTankLevel**.

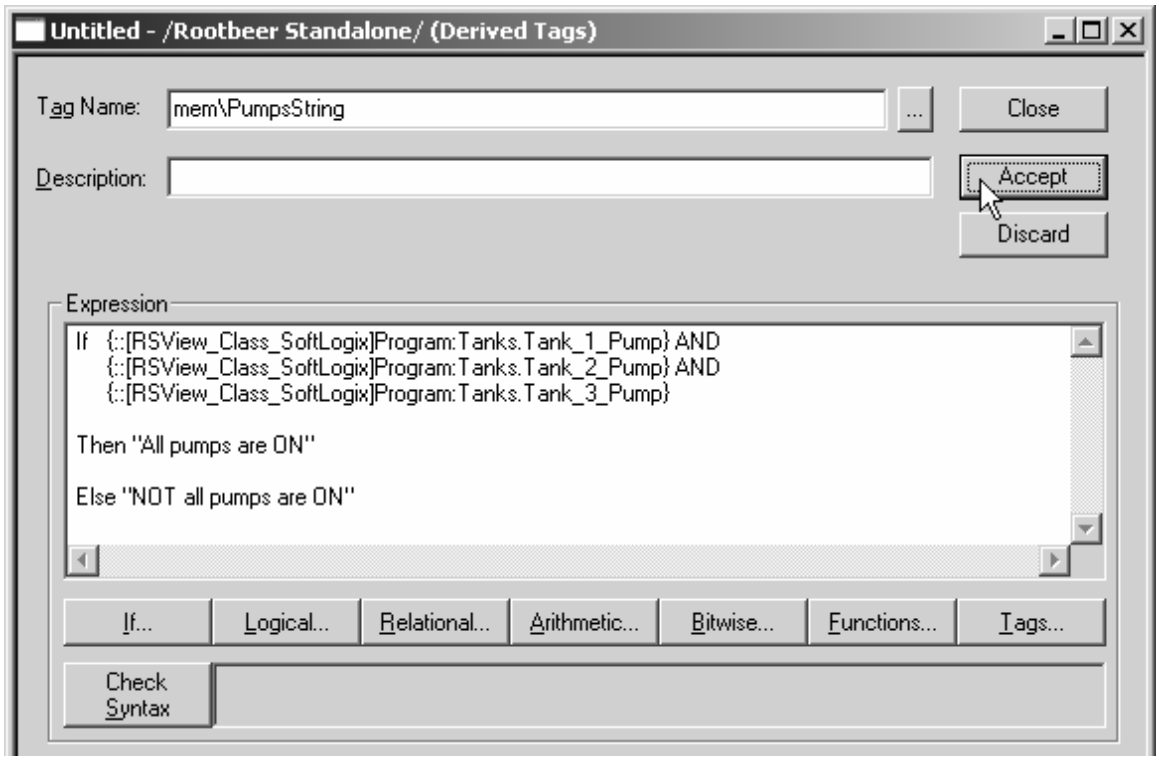




- Click **OK**, then select the new tag in the Tag Browser. Click **OK** to return to the Derived Tag editor.
- Create an expression that will sum the individual tank levels for the new derived tag. Use the **Tags** and **Arithmetic** buttons.



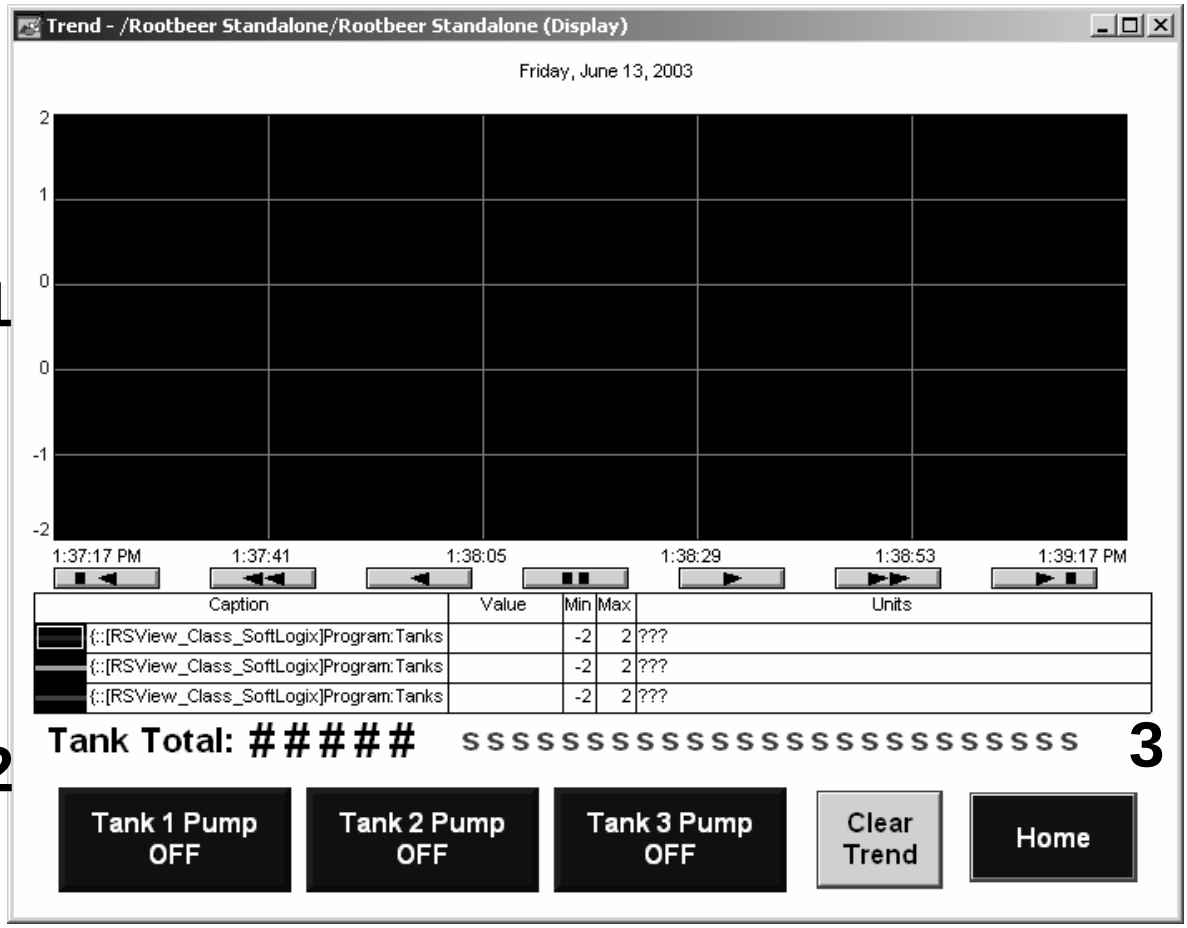
- Accept your edits and create another derived tag entry. This derived tag will be a string. It will evaluate whether all the pumps are currently on using the Tank Pump tags and a logical AND expression.
- Repeat the above steps to create a second derived tag called **mem\PumpsString**. This will be a **string** tag with a memory data source.
- Create the following If-Then-Else expression to define the string tag. Use the **If…**, **Tags** and **Logical** buttons.



- Save the derived tag file as **Tanks**.

2. Edit the Trends graphic display

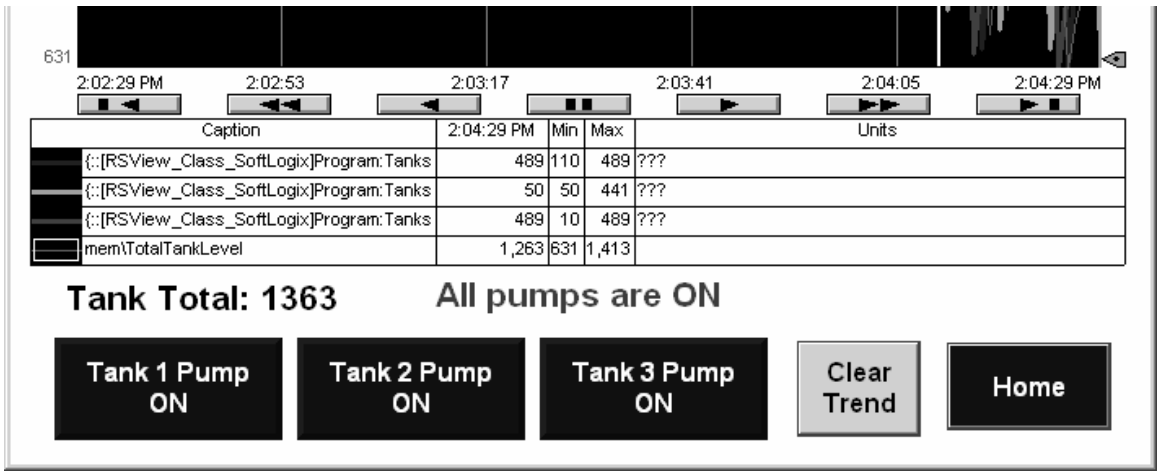
- Add to the display:
  1. Shorten the trend to make room for the new objects. Add the pen **mem\TotalTankLevel** to the trend.
  2. Add a text object to show “Tank Total” and insert the numeric variable **mem\TotalTankLevel**.
  3. Add a string display to show the value of **mem\PumpsString**.



3. Test the Derived Tag File

- Open a command line and issue the **`DerivedOn Tanks`** command.

- Go to the Trends graphic and Test the display. Confirm that the two derived tags are working correctly.



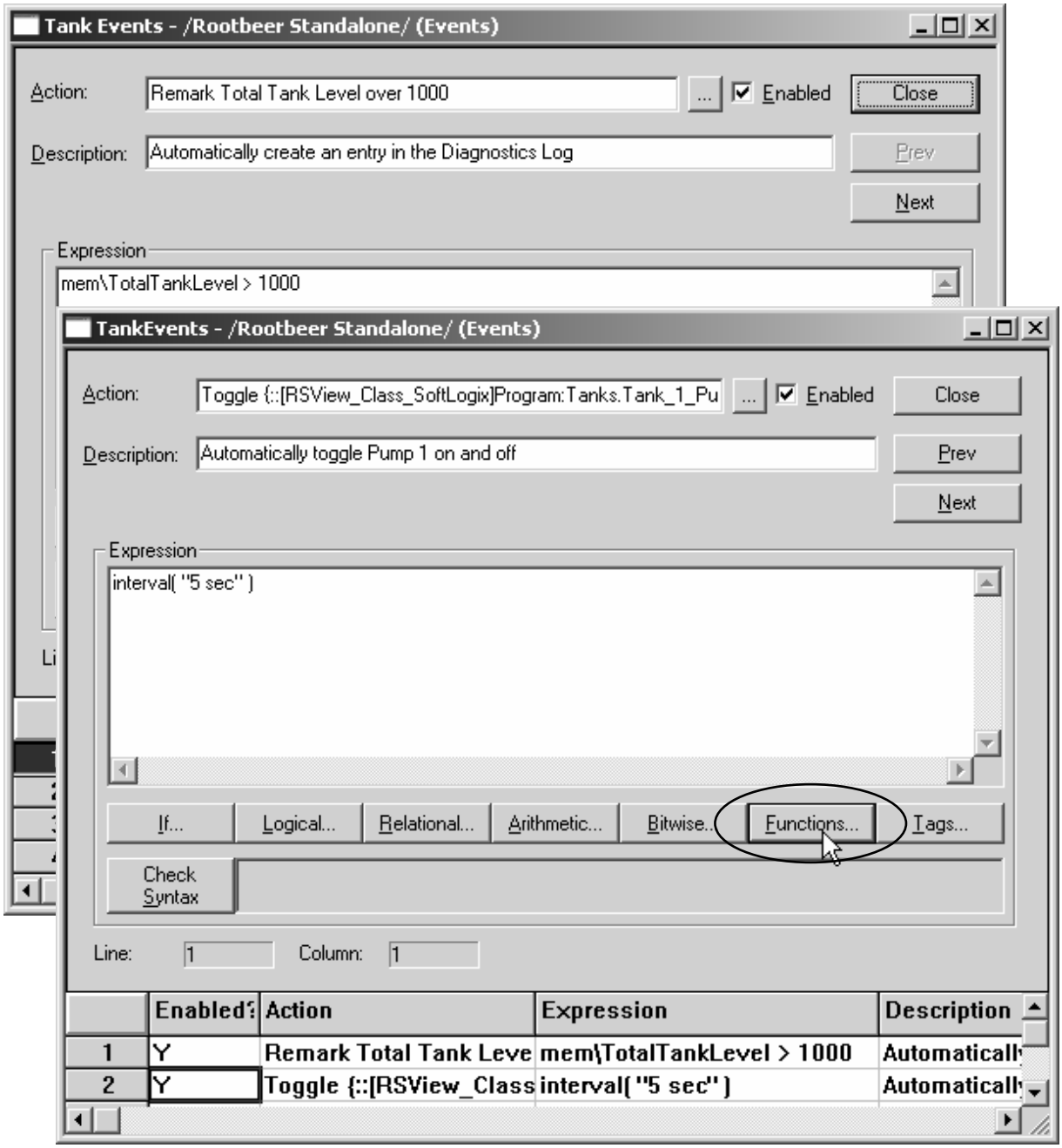
- Issue the **`DerivedOff Tanks`** command when you are done troubleshooting.

Note: Any changes you make to the derived tag file will not take effect if the file is running. You must stop then restart the file.

4. Create a new Event File

- Open a new Event file. Create two events:
  a) Make an entry to the Activity Log when the Tank Total goes above 1000. The command is `Remark <text for the log>.`
  b) Toggle the Tank 1 pump on and off every 5 seconds. Use the `interval` function in the expression, and the `Toggle` command in the action. You may have to manually add the curly brackets around the tag:

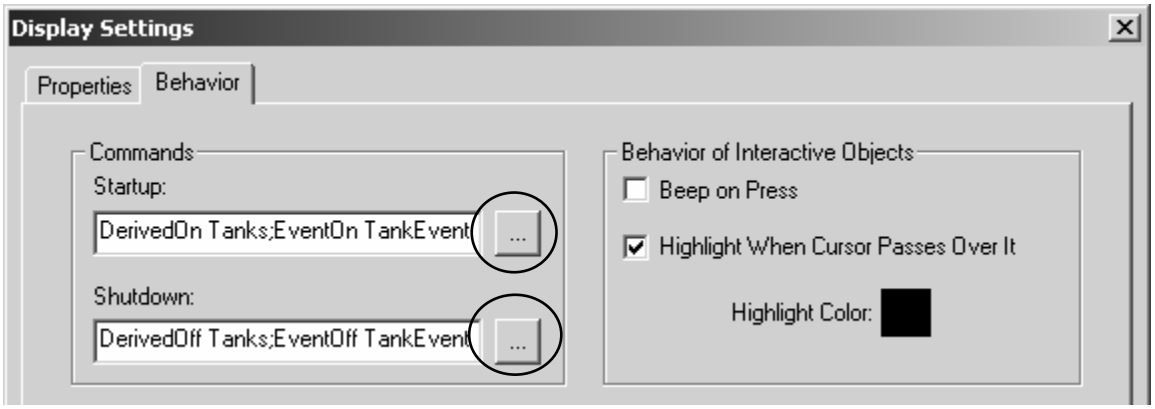
```
Toggle {::[RSView_Class_SoftLogix]Program:Tanks.Tank_1_Pump}
```



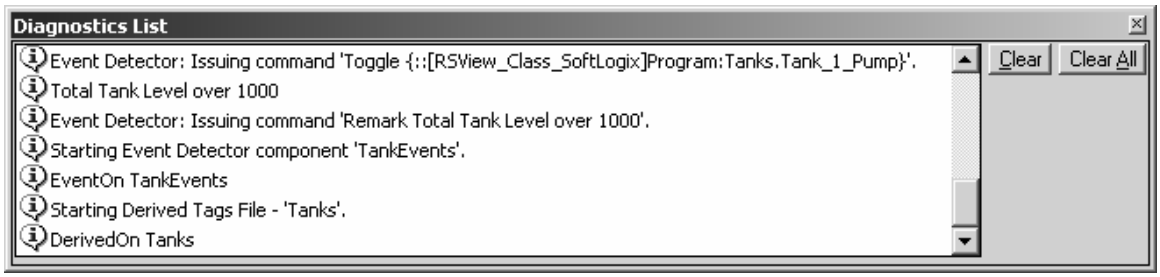
- Save the event file as **TankEvents**

5. Test the Event Files

- Instead of issuing the commands from a command line, automate the commands by placing them in the graphic display.
- Open the Trend graphic display and show the Display Settings dialog box (Edit menu). Add commands to start the Derived Tag file and the Event file to the **Startup** field. Use the command wizard – it will automatically add a semicolon in between multiple commands.
- Add commands to stop the Derived Tag file and the Event file to the **Shutdown** field.



- Test the **Trend** display. Check the Diagnostics List to see that the commands are being carried out. Close the display when you are done troubleshooting it.


Diagnostics List
Event Detector: Issuing command 'Toggle {::[RSView_Class_SoftLogix]Program:Tanks.Tank_1_Pump}'.
Total Tank Level over 1000
Event Detector: Issuing command 'Remark Total Tank Level over 1000'.
Starting Event Detector component 'TankEvents'.
EventOn TankEvents
Starting Derived Tags File - 'Tanks'.
DerivedOn Tanks
Clear
Clear All

This Lab is Finished

11. *Macros, Symbols and Keys*

Objectives:

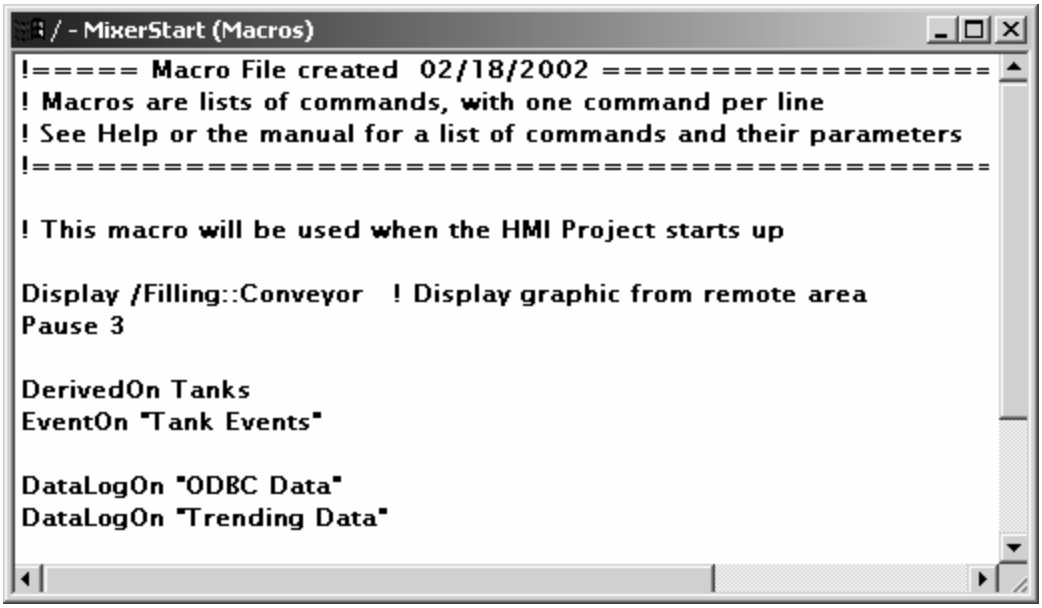
- Define what a macro does in RSView
- Build macros with the macro editor
- Understand passing parameters in macros and nesting macros
- Run a macro
- Define a symbol
- Use a symbol
- Undefine a symbol
- Understand the difference between Client, Display and Object Keys
- Create a Key file for the HMI Project
- Create key assignments for graphic displays and graphic display objects

Using Macros

A macro is a list of commands stored in a text file. To run a macro you use its name just as you would a command. For example, you can type the name of the macro in the command line and then press Enter, or use the name of the macro in an RSView button.

Create a macro with the Macro Editor in the Logic and Control folder in the Application Explorer. Right-click and select **New**, or use the **File, New** menu.

The text editor holds a list of commands. Show the Command Wizard to help you build commands by double-clicking in the macro window, or selecting **Commands** from the **Edit** menu.


/ - MixerStart (Macros)
!===== Macro File created 02/18/2002 ==========
! Macros are lists of commands, with one command per line
! See Help or the manual for a list of commands and their parameters
!==
! This macro will be used when the HMI Project starts up
Display /Filling::Conveyor ! Display graphic from remote area
Pause 3
DerivedOn Tanks
EventOn "Tank Events"
DataLogOn "ODBC Data"
DataLogOn "Trending Data"

You can comment your macro by placing an exclamation mark (!) before any comments in the file.

Macro Command Execution

RSView has multi-tasking capabilities that you can take advantage of when you create macros. Generally, the commands in a macro are executed in the order in which they are listed, with one command finishing before the next begins execution. Some commands (such as Print) finish quickly and the next command can start. Others, such as Set, take longer. In the case of Set, it does not finish until the message has been sent to the programmable controller. In cases like that, you can set up the macro so that the next command can be executed before the previous command is finished. Use the ampersand character (&) to do this.

For example, to have the command after a Set command start before the Set command finishes, place an & (ampersand character) in front of the Set command.

```
&Set tag1
```

Important - A related, but separate, case where the timing of command execution can be an issue, is where a command has set something in motion that needs to be complete before the subsequent command can be executed. This case occurs most commonly with the `Display` command where a subsequent command is intended to act on objects in the display.

Once the display is open, the next command will attempt to execute although the objects in the display might not yet be initialized. For example if you use the `Invoke` command to execute a method on an ActiveX object in a display, the Invoke command will fail if the object is not yet initialized. You can use the `Pause` command to give the objects in the display time to initialize before the next command is given.

Nesting Macros

Because a macro is used like a command, you can also place one macro within another. This is called nesting.

Macros can be nested eight levels deep.

Using Parameters in Macros

Macros can accept optional parameters. To specify an optional parameter in a macro, place a percent (%) sign followed by a parameter number after the command that will use the parameter.

When you run a macro that has optional parameters, you must also provide the parameters. To do this, type them after the macro name.

To indicate a percent in a macro you need to insert two percent signs (%%) because a single percent indicates a parameter.

Example:

A macro named **OverView** consisting of the three commands:

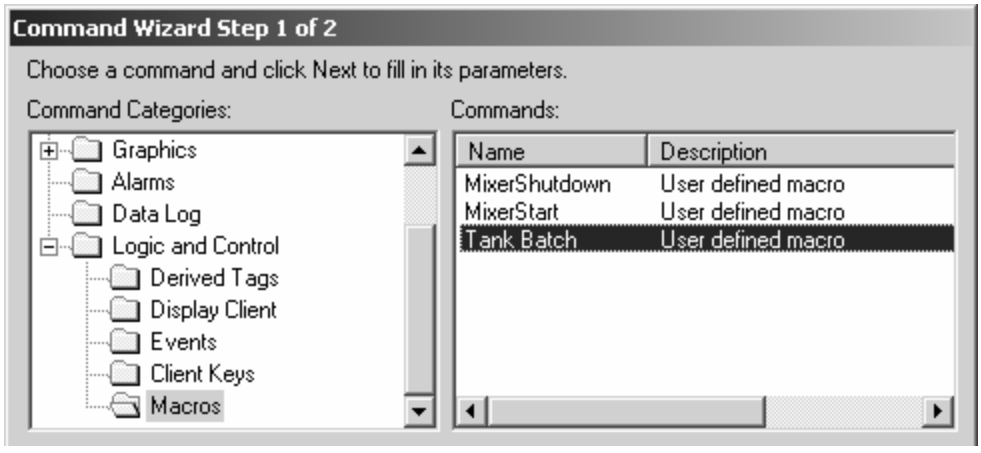
```
Display overview
Display %1
Set Tanks\inlet_valve %2
```

will do the following when the command **`OverView Detail 1`** is executed on the SE Client:

1. display a graphic called overview
2. overlap it with the graphic display **Detail** (parameter 1)
3. set the tag called `Tanks\inlet_valve` to **1** (parameter 2)

Running a Macro

Once you save a macro, its name is used to run it. Simply use the name of the macro anywhere you would use an RSView command – the command line, a button, Display Settings Behavior, etc… Macros are listed in the Command Wizard.



Because of this behavior, be careful when naming macros. For example, if you have a macro named Display and try to run it, the Display command will run instead. Be sure that macro names do not conflict with RSView commands.

Using Symbols

A symbol is an abbreviation for a command or a command with parameters. It can be used anywhere a command is used. This command is only executed on a client (RSView Studio, SE Client or Administration Console).

Symbol definitions are valid only during the current client session; they must be re-defined each time the client is restarted. Symbols are typically defined in a startup or login macro.

Create a symbol with the `Define` command. For example:

```
Define UP Ramp Mixing\Mixer_rpm_setpoint +10
```

Now issuing the command `UP` will execute the above `Ramp` command.

Issuing the `Undefine` command will delete a symbol:

```
Undefine UP
```

`Undefine *` - this command will remove all symbol definitions

Symbols, like macros, may be named identical to a command. Avoid doing this! If you do this, it will redefine the command name. For example, if you issue the command

```
Define Display Ramp Mixing\Mixer_rpm_setpoint +10
```

Now issuing the command `Display` will execute the above `Ramp` command.

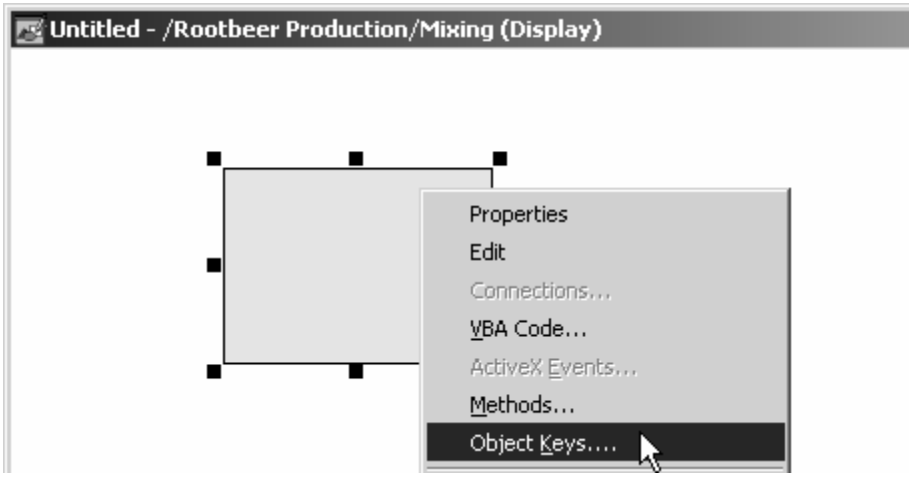
Using Keys

Keys allow you to define an RSView command to a keyboard key sequence. For example, you could create a key association so an operator could press F3 and be presented with the main graphic display.

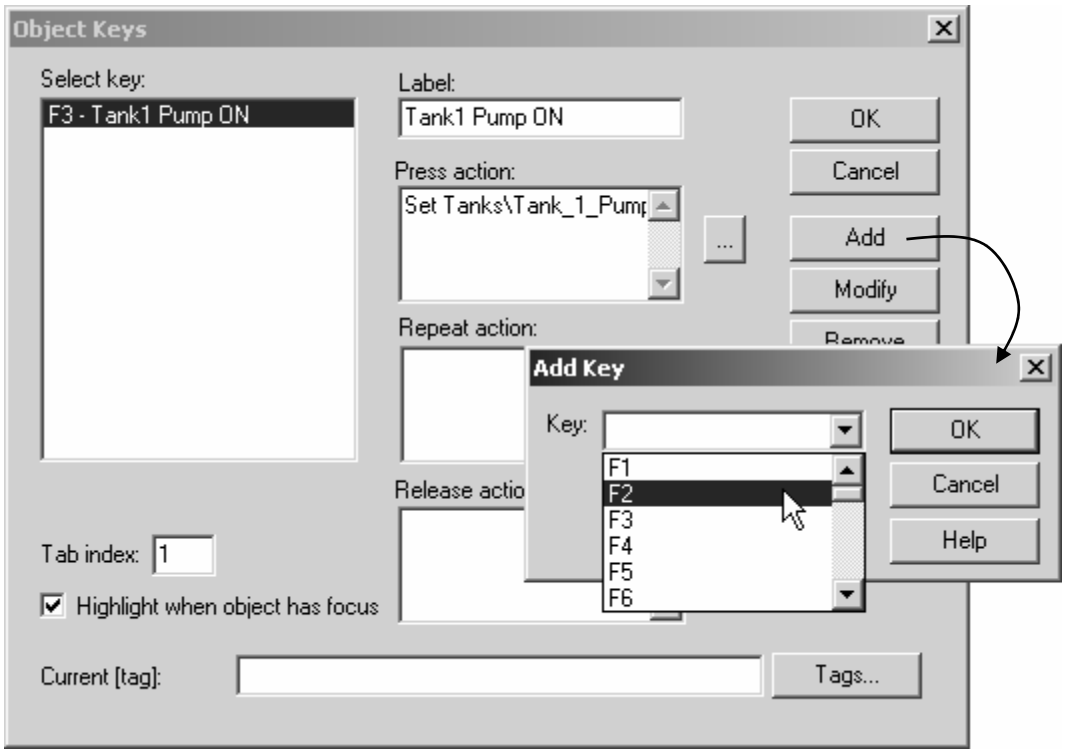
There are three levels of keys:

Object Keys

You may assign a key to be active only when a particular graphical object has focus. This type of key will not be in effect otherwise. Access the Object Key dialog box from the right click menu, or from the Edit menu.

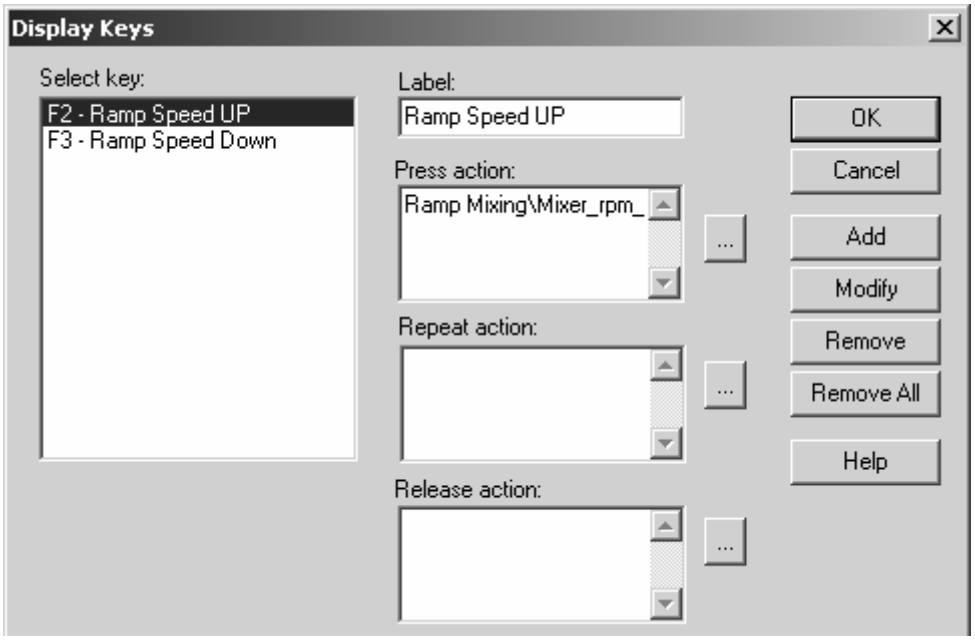


Click the **Add** button to configure a key. Select one from the list, then associate a command with the key.



Display Keys

Display Keys are in effect when the graphic display, not any particular object, has focus. They are configured the same way as Object Keys.



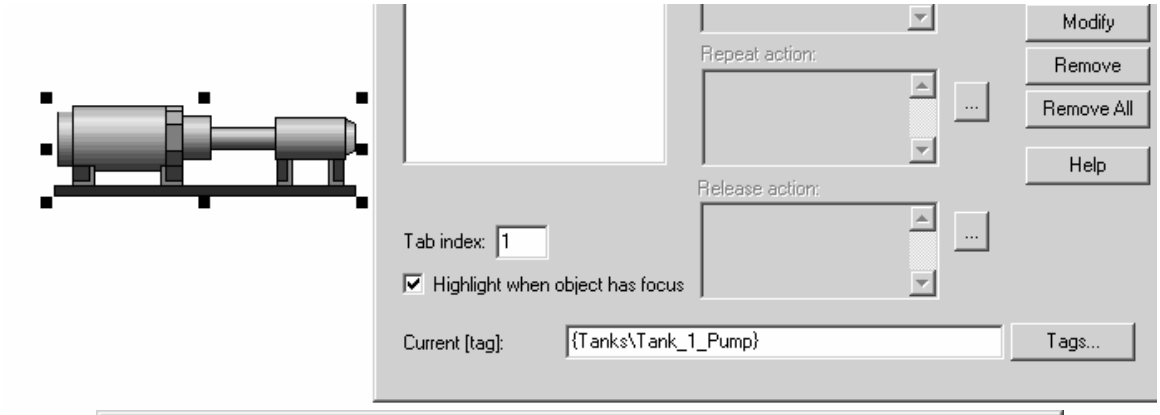
Using Object and Display Keys Together

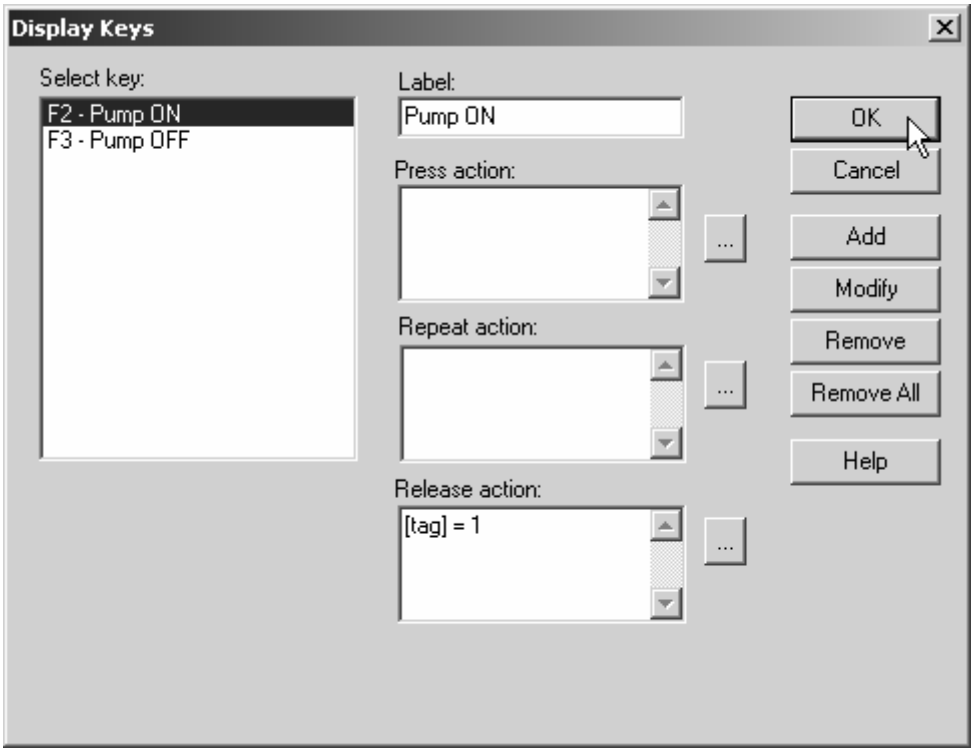
It is possible to pass a parameter from an object key to a display key.

The Object Key Current [Tag] parameter is a placeholder for a tag name or any character string. Use this parameter to create a command that is object specific.

For example, if you want F2 to set the value of a selected object's tag to 1, you would set up a **display key** for F2, using the [tag] parameter, and then set up **object keys** for each object on the screen, specifying which tag to use for each object.

When the display runs, pressing F2 on an object will substitute the tag in the Object Key Current [tag] field into the Display Key action.





Client Keys

Client keys, like object and display keys, allow the operator to interact with the system at run time to do things like change displays or set tag values. Object and display keys are defined in the Graphics Display editor. Client keys are defined for an application using the Client Keys editor. They are enabled whenever the application is running on an SE Client, unlike object and display keys which are active only when their associated object or display is. However, object and display keys take precedence over client keys.

The order of precedence for key animation is: object keys, display keys and client keys. This means, for example, that if a key has both object and client key definitions, when the object has focus at run time and the key is pressed, the object key action will be carried out and the client key action will not.

Note - When a non-native embedded OLE object such as a Microsoft Excel worksheet has focus, its keys always take precedence over all three levels of keys defined above. This means that if, for example, a key has both a display action assigned to it and an action assigned to it within the non-native OLE object, when the OLE object has focus, its key action will be carried out and the display action won't.

You may create multiple Client Key files. They are saved in the Logic and Control section of the HMI Project.

You may specify a key file to be used in the SE Client Wizard, covered later in this book.

You may also issue the `Key` command to start a Client Key file. Issuing the `Key /r` command will stop client keys from running.

`Key "Startup Keys"` – enables the **Startup Key** client key file

`Key /r` – disables all client keys.

Lab 12 – Macros, Symbols and Keys

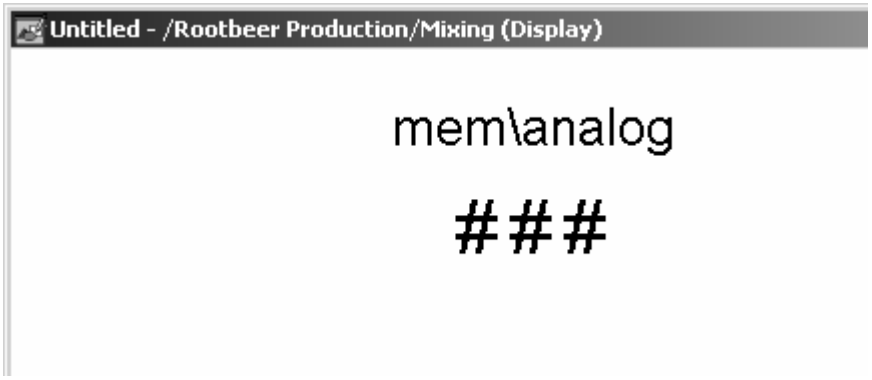
Objective: In this lab, you will create symbols, macros and keys assignments.

Software Requirements:

- RSView Studio
- SoftLogix 5860 running RSView_Class_SoftLogix program

1. Test Symbols

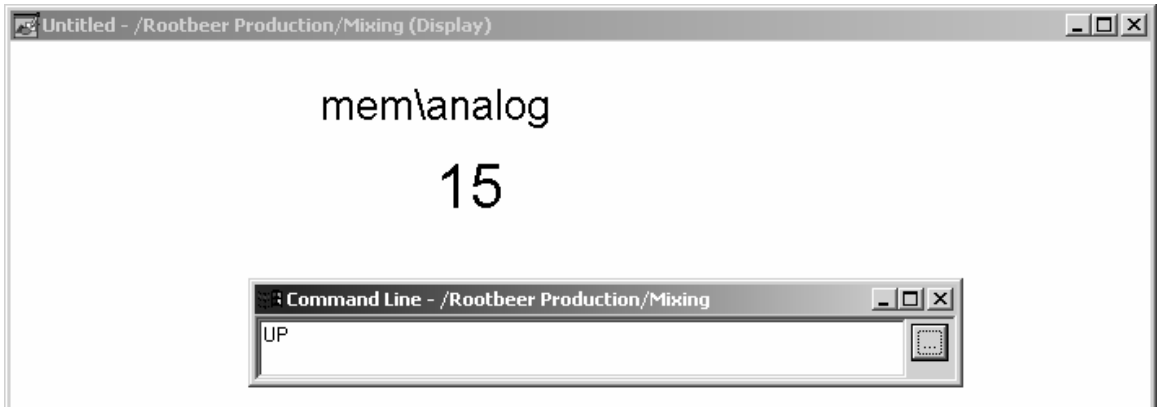
- Symbols are best used as shortcuts while you are editing a project. Test this by creating a new graphic. Place a numeric display of the tag `mem\analog`.



- Open a command line. Issue the following two commands:

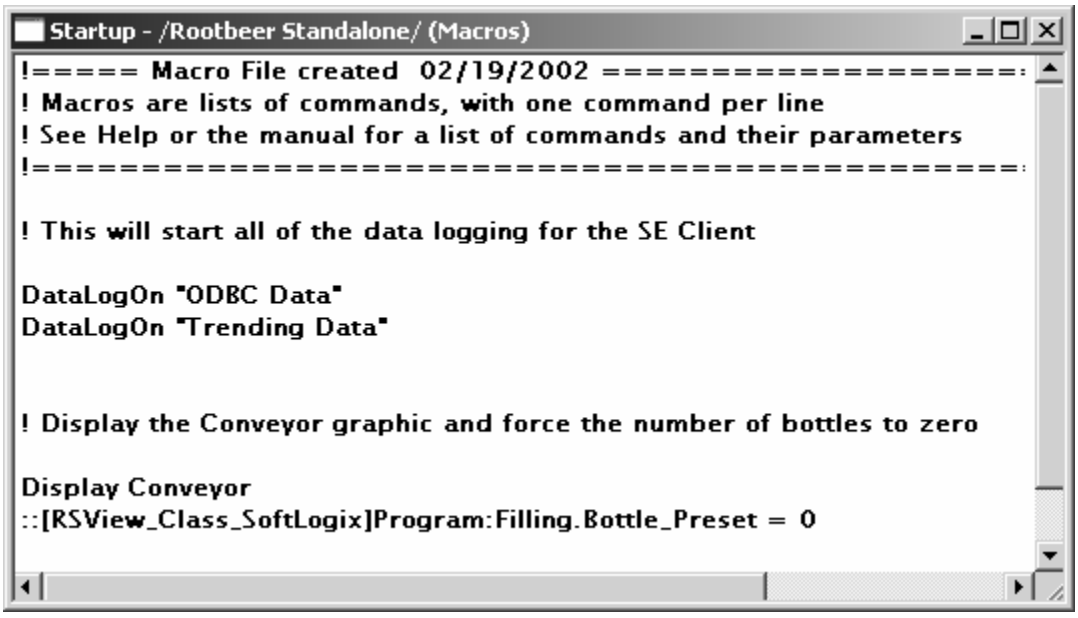
```
Define UP ramp mem\analog +5
Define DOWN ramp mem\analog –5
```

- Test the graphic, and show a command line. Issue the UP and Down commands and observe the effect. Note – the up arrow on the keyboard will scroll through past command line commands. Close the display (don't save it) when you are done.

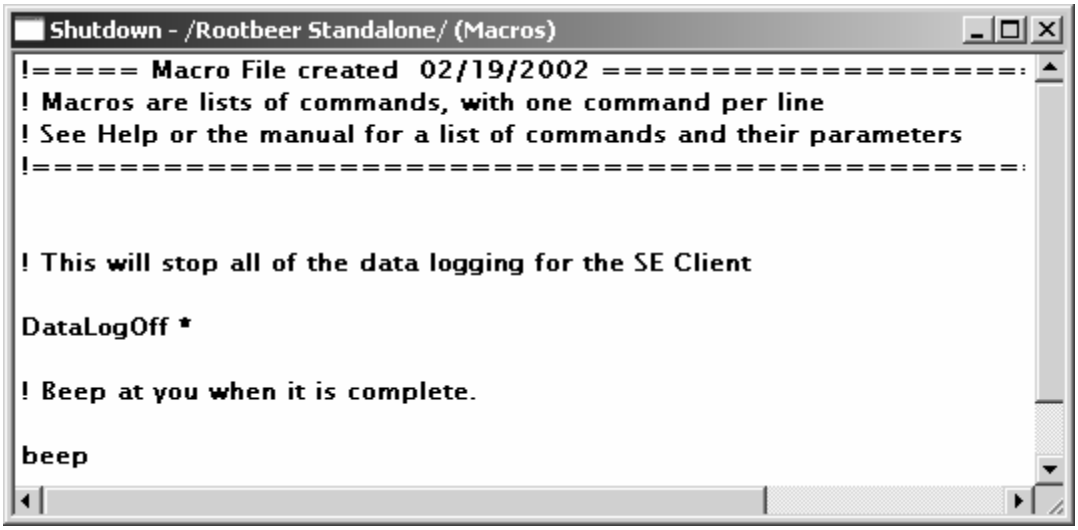


2. Create macros

- Create two new macros. The first will be named **Startup**, and contain commands to start data logging, display a graphic, and set a tag = 0. Use the Command Wizard to build the commands.

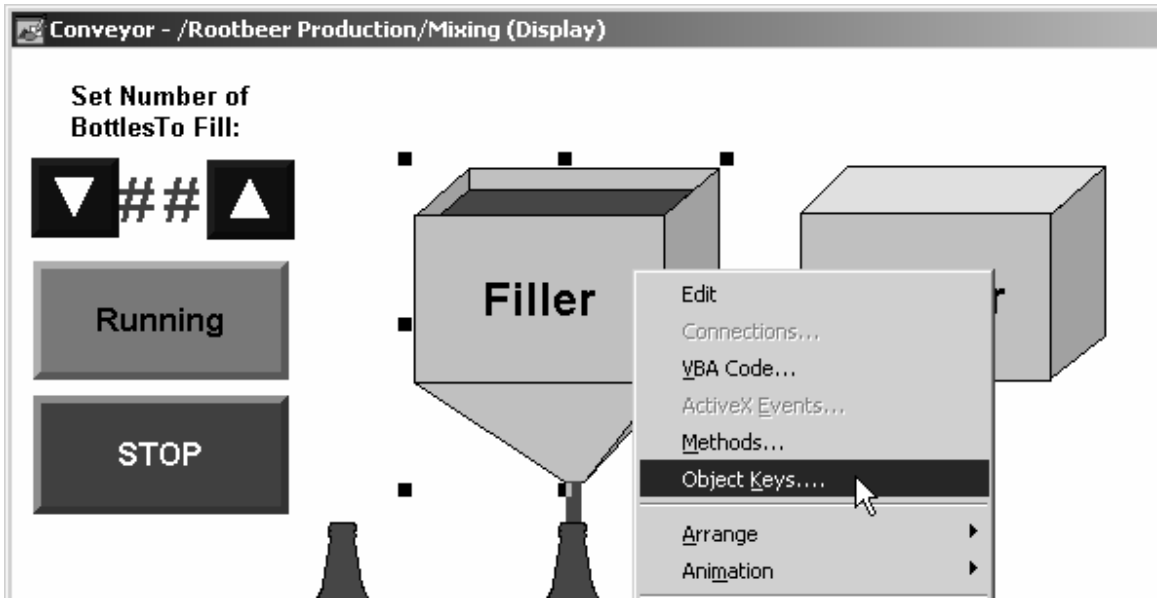

Startup - /Rootbeer Standalone/ (Macros)
!===== Macro File created 02/19/2002 ==========
! Macros are lists of commands, with one command per line
! See Help or the manual for a list of commands and their parameters
!==========
! This will start all of the data logging for the SE Client
DataLogOn "ODBC Data"
DataLogOn "Trending Data"
! Display the Conveyor graphic and force the number of bottles to zero
Display Conveyor
::[RSView_Class_SoftLogix]Program:Filling.Bottle_Preset = 0

- Create a second macro called **Shutdown** to stop the data log models and beep when it is done.

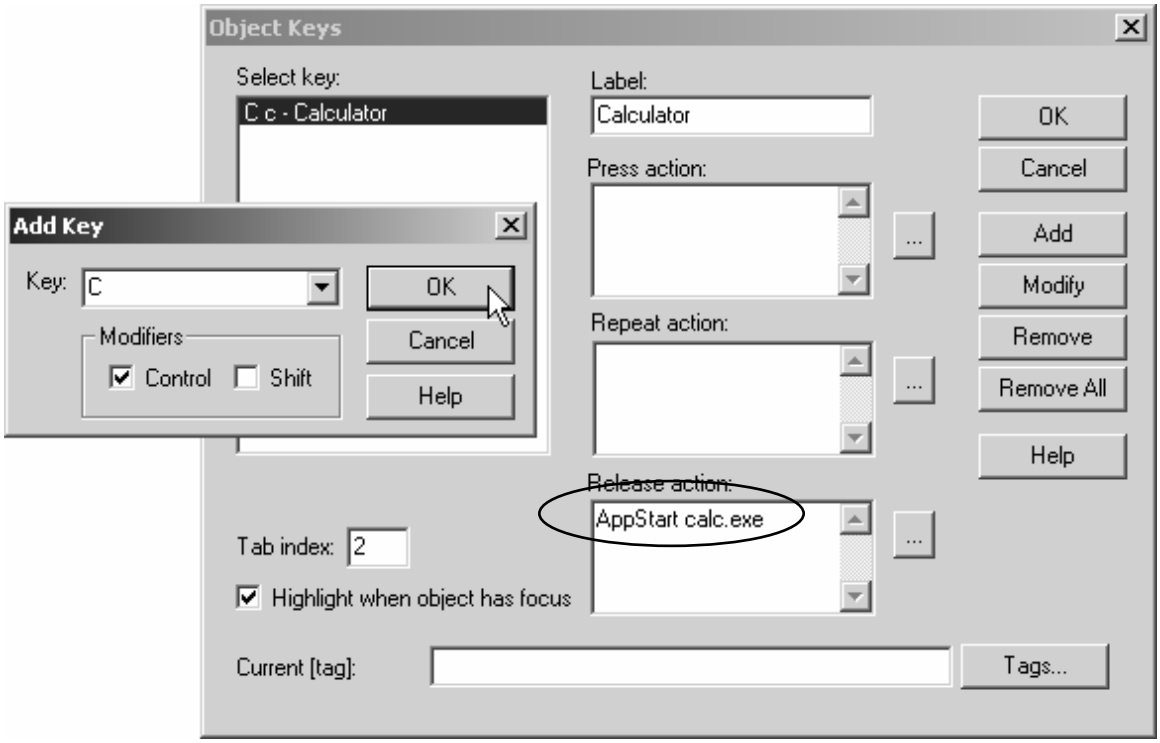

Shutdown - /Rootbeer Standalone/ (Macros)
!===== Macro File created 02/19/2002 ==========
! Macros are lists of commands, with one command per line
! See Help or the manual for a list of commands and their parameters
!==========
! This will stop all of the data logging for the SE Client
DataLogOff *
! Beep at you when it is complete.
beep

3. Create Keys

- Open the **Conveyor** graphic display.
- Create an Object Key. Right-click on the "Filler" machine and select **Object Keys**.

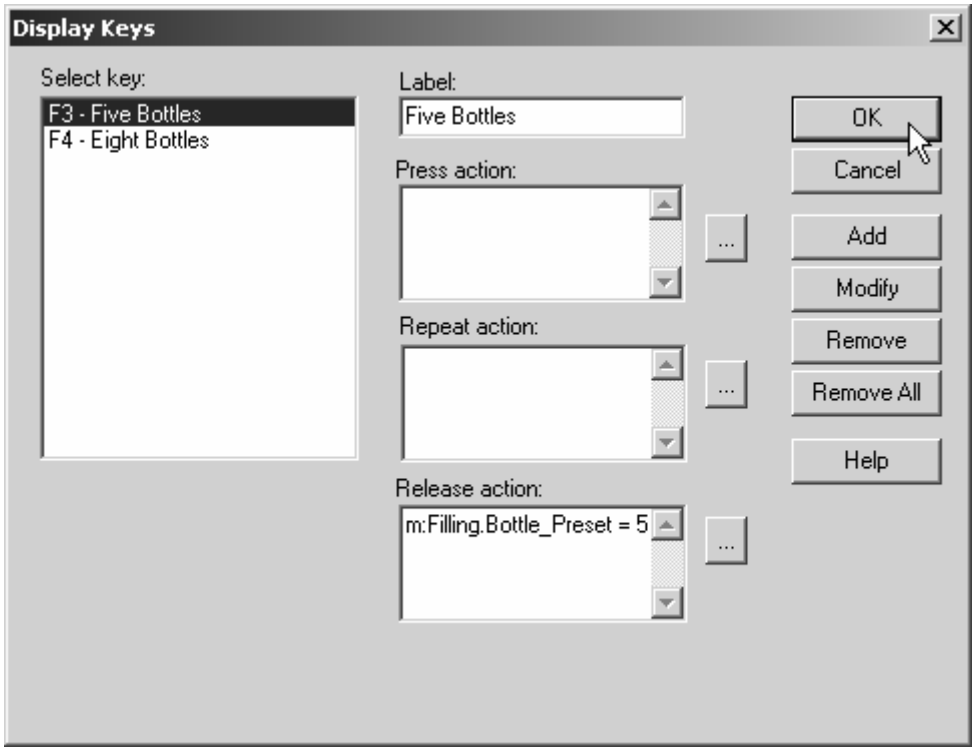


- Configure the **Ctrl-C** key sequence to start the calculator. Close the window when you are done.

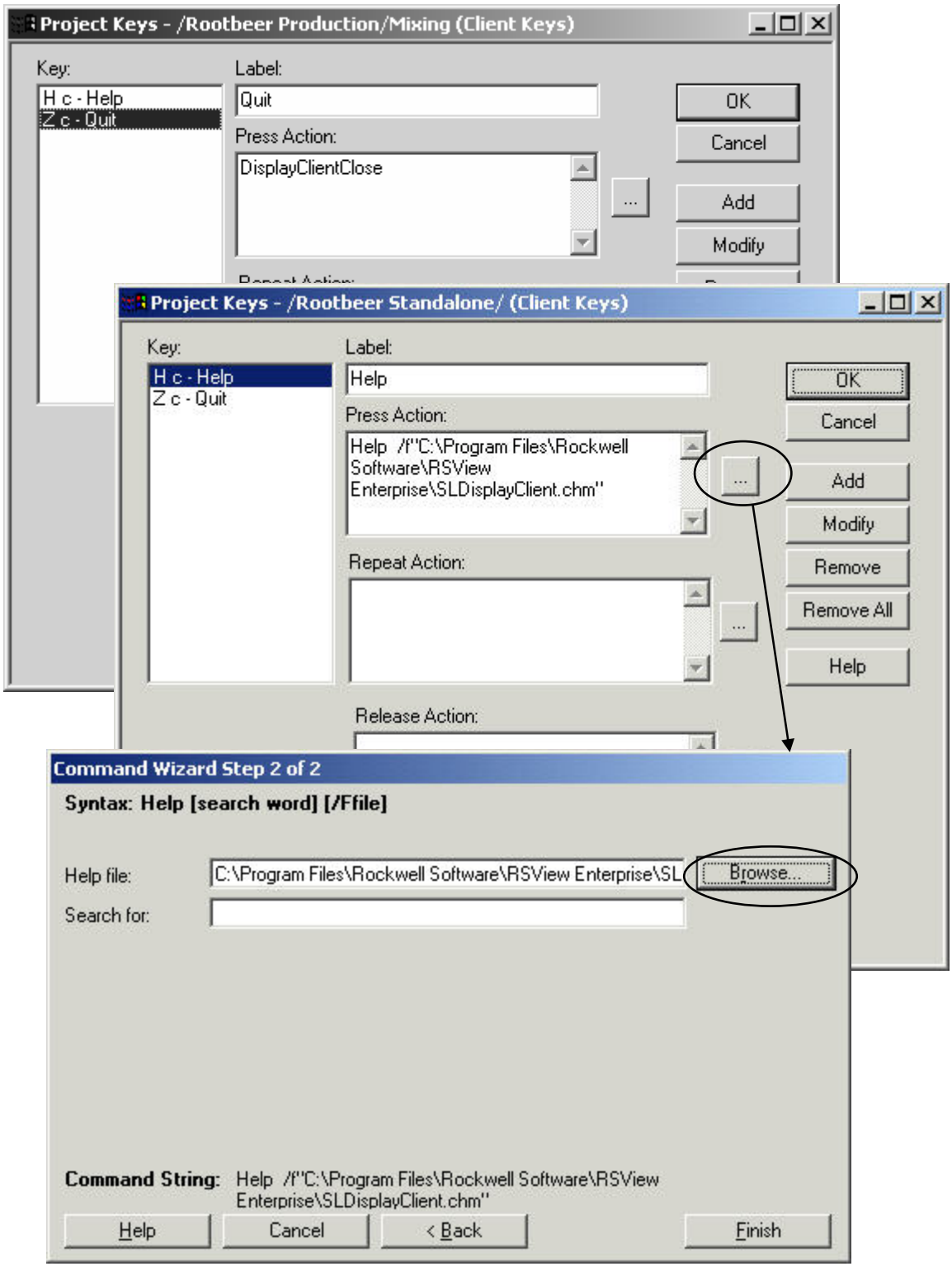


- Create Display Keys – Open the Display Keys editor from the **Edit** menu and configure two keys. Add appropriate labels to the keys. Use the command wizard (**=** command).

```
F3 – ::[RSView_Class_SoftLogix ]Program:Filling.Bottle_Preset = 5
F4 - ::[RSView_Class_SoftLogix ]Program:Filling.Bottle_Preset = 8
```

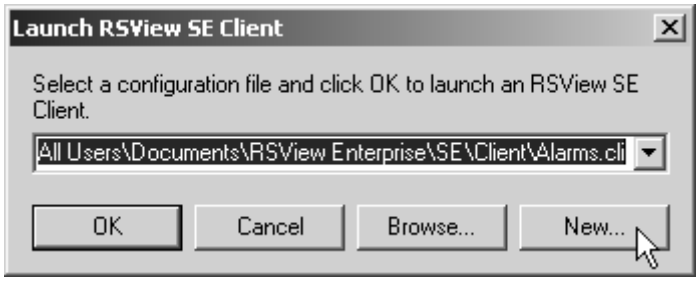


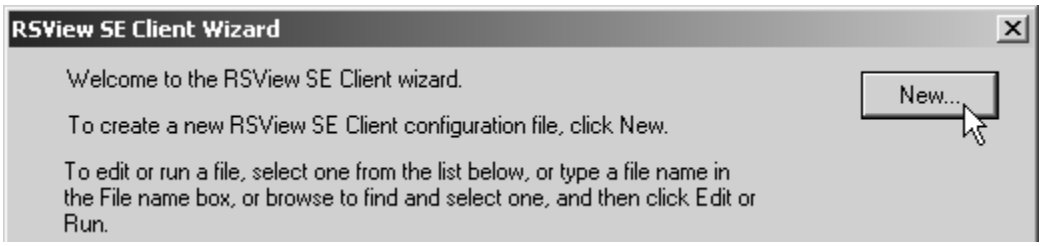
- Create a Client Key file. Name it **Project Keys** and include two keys:
- `Ctrl-Z` – Issue the `DisplayClientClose` command to shut down the client
- `Ctrl-H` – Use the `Help` command to bring up a Help file and search for a topic:



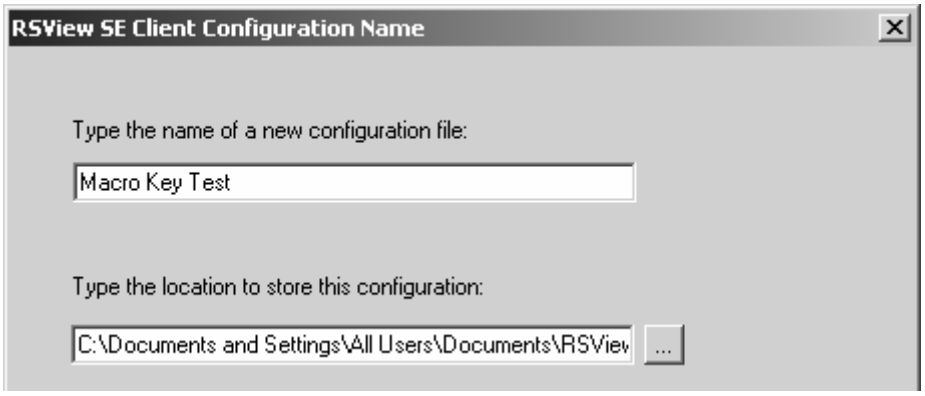
4. Build an SE Client to test functionality

- Click **Launch SE Client** from the **Tools** menu. Click **New** twice

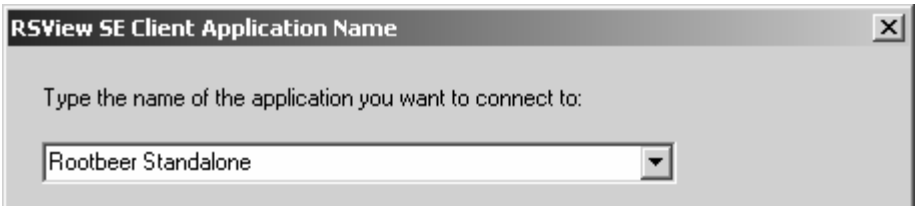



RSView SE Client Wizard
Welcome to the RSView SE Client wizard.
To create a new RSView SE Client configuration file, click New.
To edit or run a file, select one from the list below, or type a file name in the File name box, or browse to find and select one, and then click Edit or Run.
New...

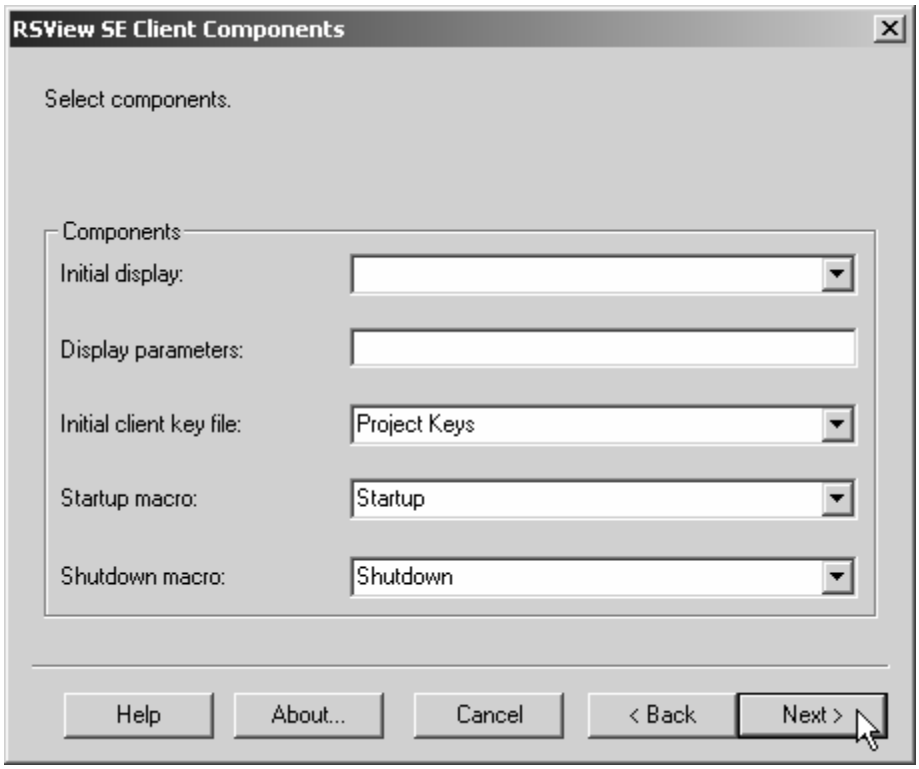
- Name it **Macro Key Test** and accept the default location.


RSView SE Client Configuration Name
Type the name of a new configuration file:
Macro Key Test
Type the location to store this configuration:
C:\Documents and Settings\All Users\Documents\RSView
...

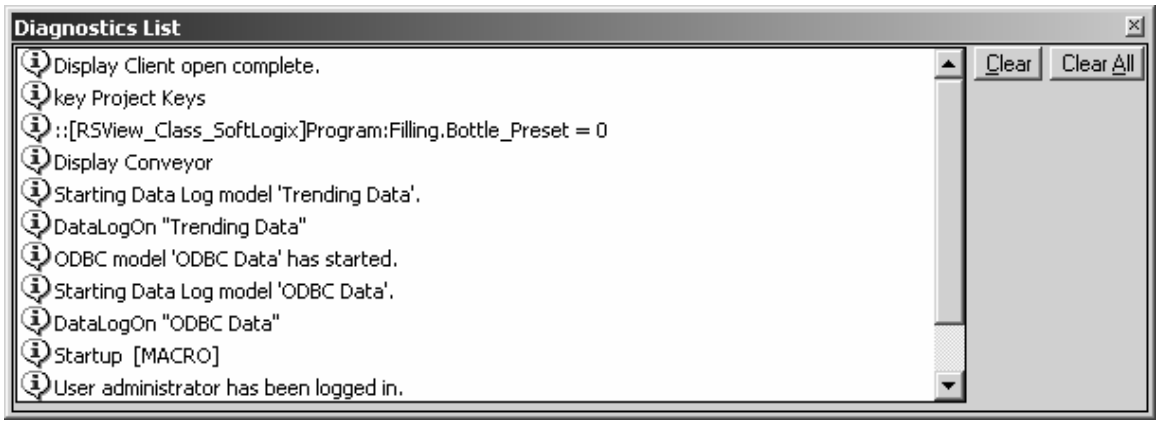
- Select the Stand-alone option. Click **Next**.
- Select your application. Click **Next**.



- Configure the following Key File and Macros.

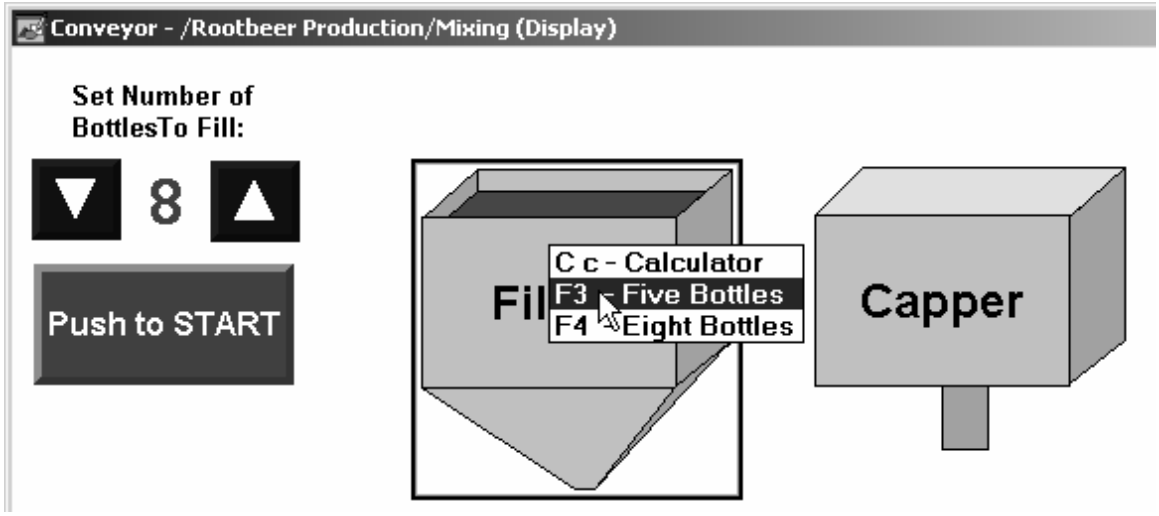


- Accept the rest of the defaults. Choose to save the configuration and open the SE client.
- Look at the Diagnostics List on the SE Client to see that the Startup Macro has run.



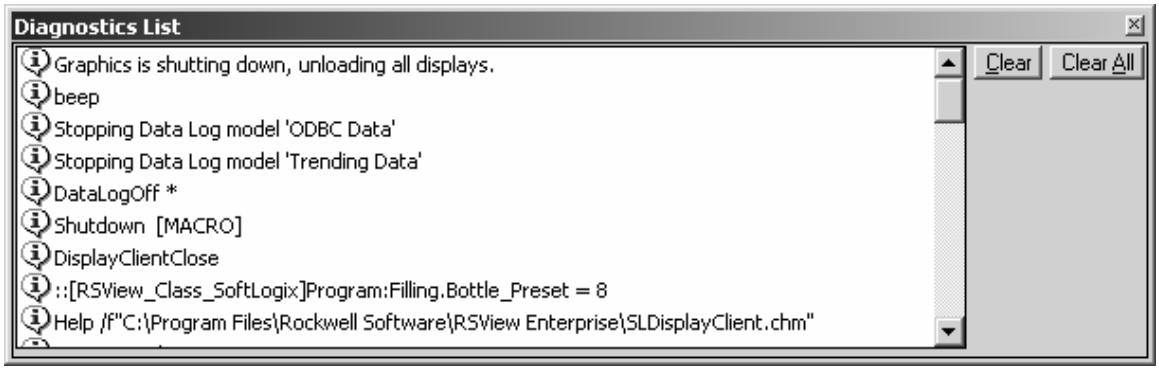
5. Test the running client:

- Click the Filling machine. The KeyList is shown – all the Object and Display keys.



- Use the F3 and F4 keys on the keyboard to change the bottle preset number.
- Use the Ctrl-C key when the Filler machine has focus to start the calculator
- Use the Tab key to shift focus off of the Filler machine. Which keys work and which don't?
- Use the Ctrl-H key (client key) to bring up the Help system
- Use the Ctrl-Z key to close the client.

- Look at the Diagnostics List in RSView Studio to see the result of the Shutdown macro.



This Lab is Finished

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12. *Security*

Objectives:

- Explain what elements of an Application may be secured
- Configure User Accounts in RSView
- Configure Login / Logout macros for Users
- Configure Security codes for Users
- Apply security to the Application
- Apply security to commands
- Apply security to HMI tags
- Apply security to graphic displays
- Use the login and logout commands
- Use the Electronic Signature ActiveX control
- Implement the DeskLock Utility to secure a workstation

Implementing Security

Security provides a way to restrict access to certain parts of an application. When you assign a security code, for example to a command, only those users who have access to the code can use the command. There are 17 security codes, A through P, and the asterisk symbol (*). The * represents unlimited access. Security codes can be assigned to commands, macros, graphic displays, OLE objects, and HMI tags. In addition, the entire application may be secured to prevent unauthorized editing.

There are two approaches to setting up security: by inclusion and by exclusion. Security by inclusion restricts access to certain parts of the system, leaving the rest available to all users. Use this method in situations where most users can have access to most of the system.

Security by exclusion restricts access for all users, except the system administrator, to only a few, specific parts of the system. Use this method in situations where most users should have access to only a few commands, macros and so on.

The basic steps for setting up security are:

1. Configure User Accounts
2. Apply security to the elements you wish
3. Provide a way for user to log in and out

User Accounts

User accounts work with security codes to determine who has access to which components in an application.

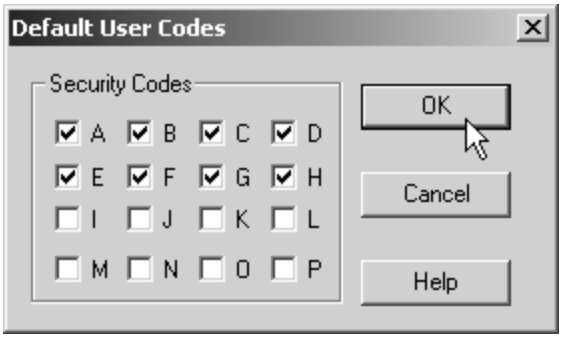
Important: The source of Windows Users and Groups will depend if you are operating in a Windows Domain or a Windows Workgroup.

In a domain, all users and groups are in one central location. Choose the domain in the drop-down box.

In a workgroup, there is no central administration of Users and Groups. Each user and group must be added to each local computer. (Control Panel, Administrative Tools, Computer Management, Local Users and Groups)

User Accounts are application-wide, not limited to any individual HMI Project in the application.

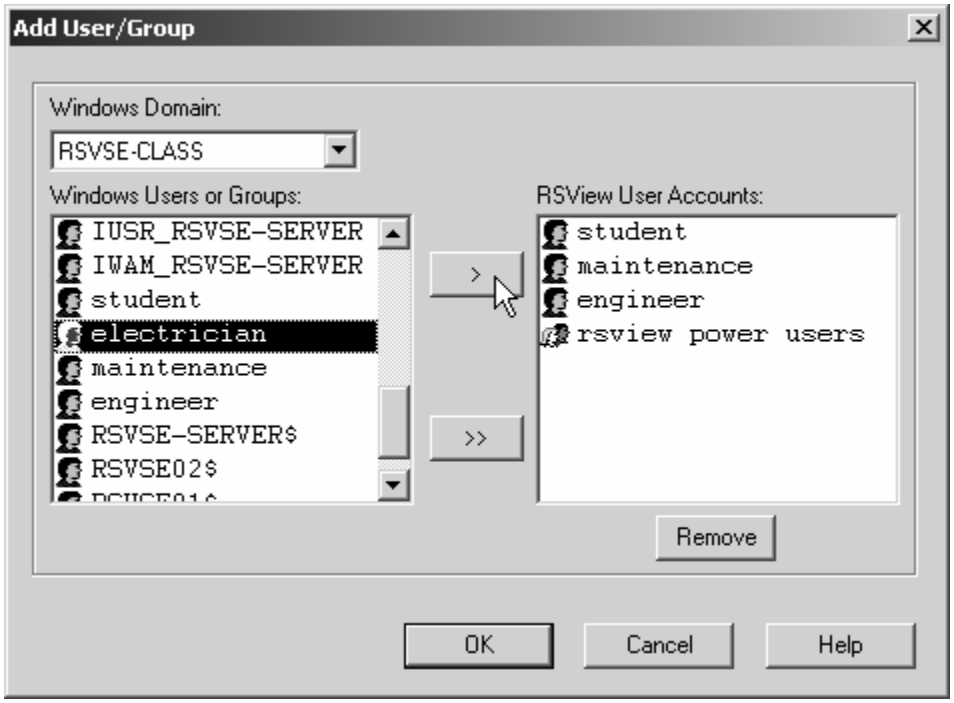
You may create a default account so every new user added has the same security codes. Select **Default User Codes** from the **Setup** menu.



Select the Windows domain that contains the Users and Groups you wish to include. The local computer name, as well as the Domain that the computer is a member of, will show in the drop down box.

Add a user account by using the Add User/Group item on the **Setup** menu in the User Accounts editor, or by selecting the Add User/Group button.

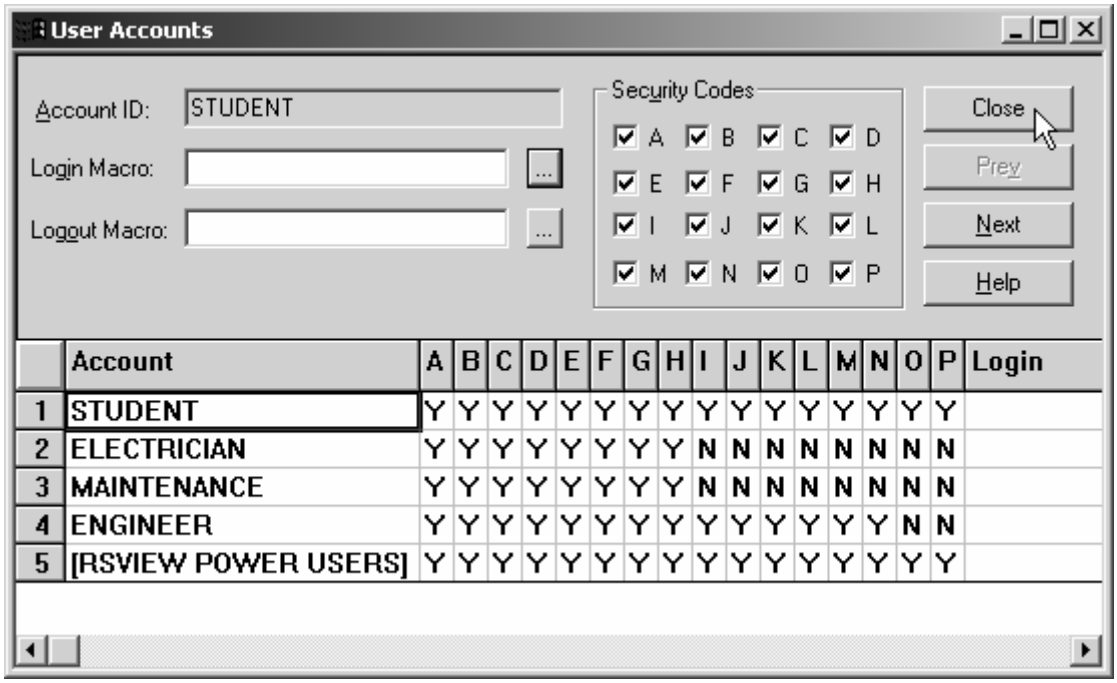
Select users or groups from the left pane and double-click or use the arrow button to create RSView User Accounts.



Use this dialog box to remove users from the security system as well as add them.

You may assign a Login or Logout macro to an account. This may be any command you wish to execute when a user logs in or out.

Use these macros to customize the Client for a particular user. For example: Display an overview screen automatically when a supervisor logs in.



	Account	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Login
1	STUDENT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
2	ELECTRICIAN	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	
3	MAINTENANCE	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	
4	ENGINEER	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	
5	[RSVIEW POWER USERS]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

You must save the changes in the User Accounts dialog for them to take effect.

Securing the Application

The entire application can be protected from unauthorized editing by placing a security code on it. Right-click on the application name and select Properties. Associate a security code with it. RSView Studio will check the user logged into Windows to authorize the editing of the application.

This only applies to a distributed application. Standalone applications don't have a security code associated with them.

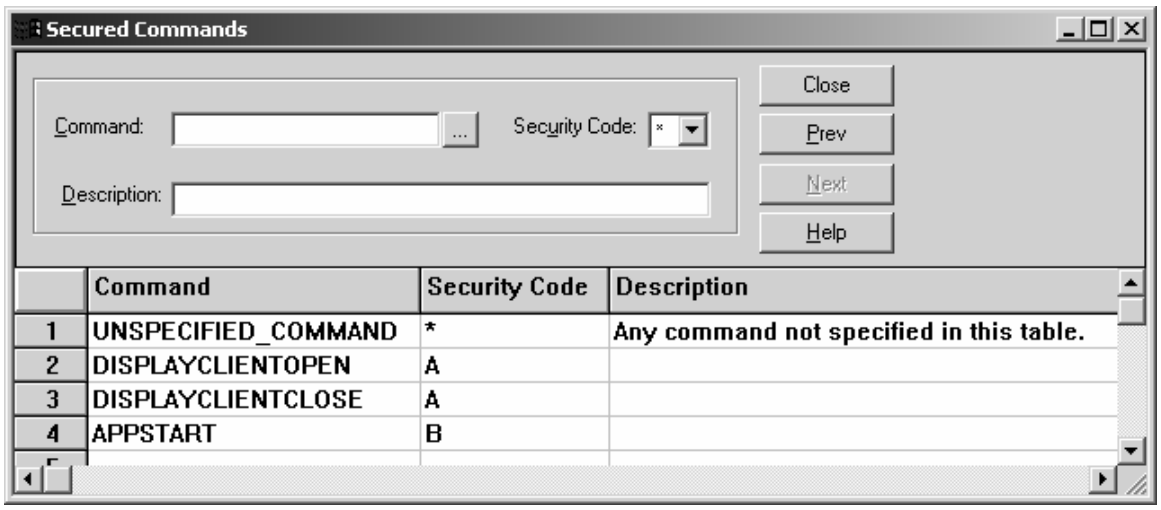
An unauthorized user attempting to open an application will see this dialog box:

Login
You do not have security privileges to access this application.
To login as a different user, click Retry.
To abort the application open, click Cancel.
Retry
Cancel

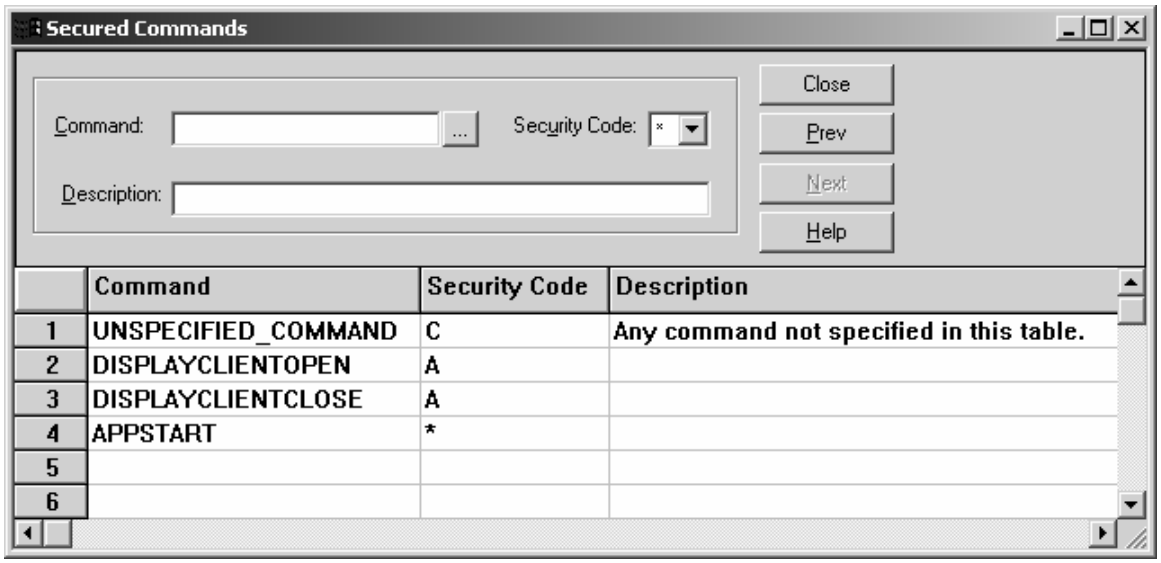
Securing Commands

Open the Secured Commands editor to restrict access to commands. By default, all users have access to all commands. The asterisk (*) means no restriction.

Select commands and associate them with a required security code. Leaving the default to no security and then individually securing select commands is called Security by Inclusion.



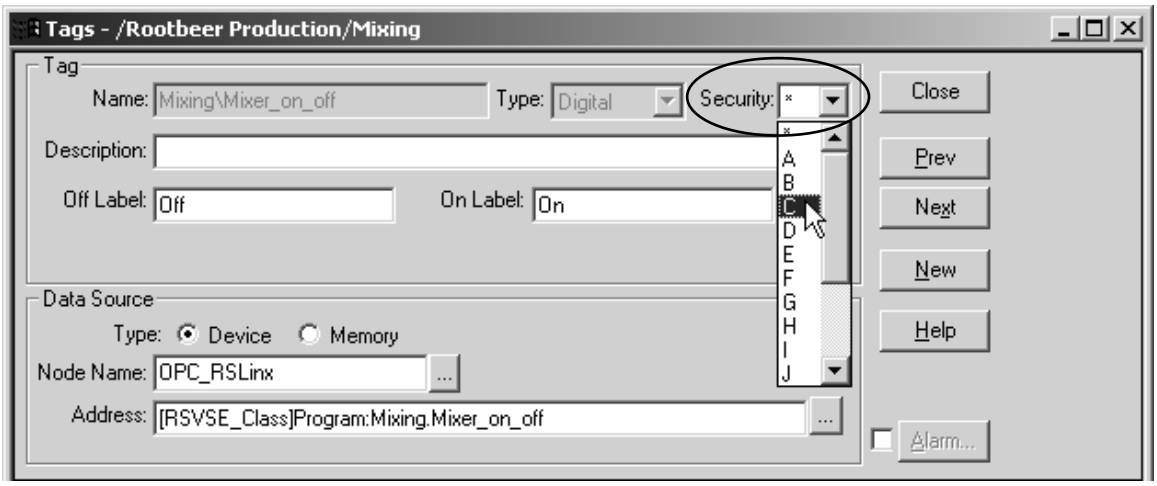
An alternative is to apply a security code to the UNSPECIFIED_COMMAND. This means that all commands require that code. You may individually assign other codes, or the * to any other commands. This is called Security by Exclusion.



Securing HMI Tags

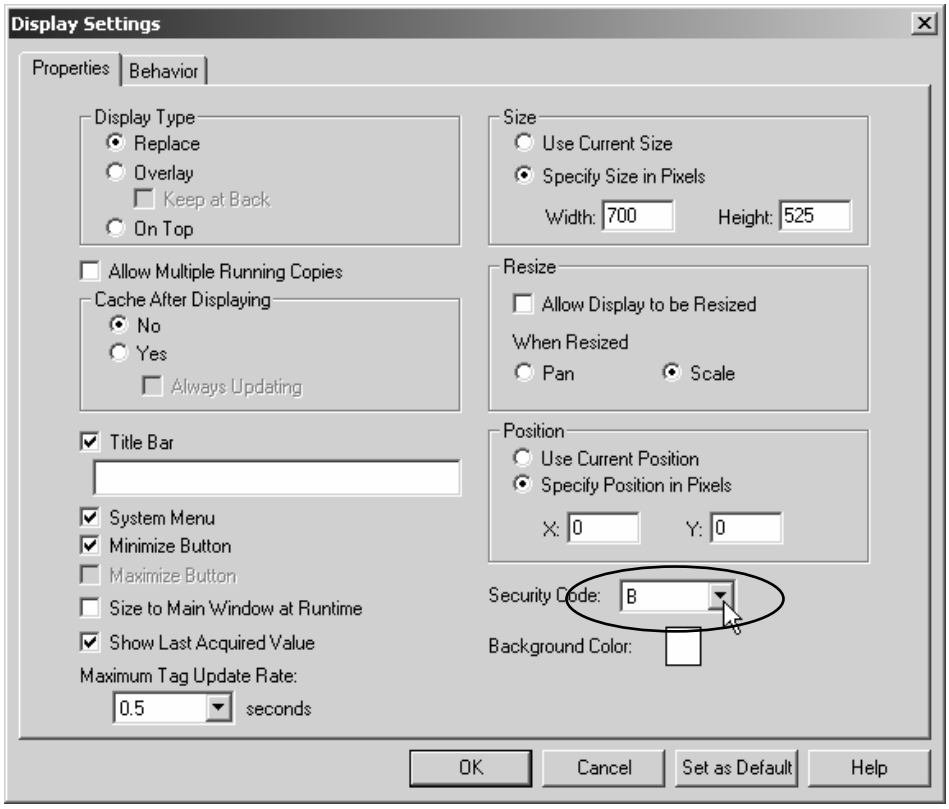
Every tag in the HMI Tag Database Editor may be assigned a security code. If the logged in user does not have access to the code, the tag may be read, but not written to.

There is no security on a tag by default. Tags referenced directly from an OPC server (tags not in the HMI tag database) have no security.



Securing HMI Graphics

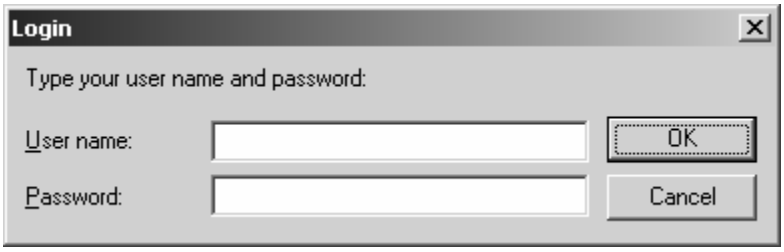
Every graphic display has a security setting in its Display Settings. The default is no security on a graphic display.



Login and Logout

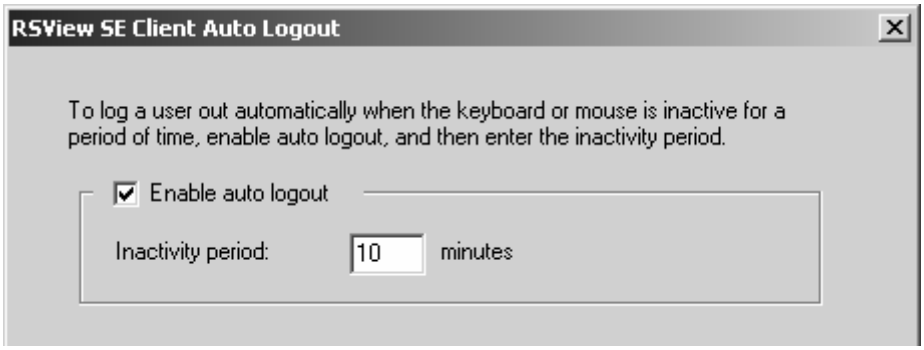
When RSView SE Studio or an SE Client opens, it inherits the security context of the currently logged-in Windows user.

Issuing a `Login` command from an SE Client will bring up a login dialog box



A user may log out of the SE Client with the `Logout` command. The login dialog is displayed until another user logs in. This leaves the SE Client in a secured state.

The SE Client may be configured to automatically log out after a period of time.


RSView SE Client Auto Logout
To log a user out automatically when the keyboard or mouse is inactive for a period of time, enable auto logout, and then enter the inactivity period.
Enable auto logout
Inactivity period:
10
minutes

Electronic Signature Verification

The RSView electronic signature verification and authorization feature provides a way to secure operations by verifying the identity of the operator before an action can occur. This is done through the Signature Button which is an ActiveX control that only allows certain operations to be performed if the operator provides the appropriate user name and password.

The operations that can be secured in this way are:

- setting a tag value
- issuing an RSView command
- downloading all input field values on a display

For added security, the Signature Button can also be set up so that authorization by another person, such as a supervisor, is required before the operation can be carried out.

At run time, if a user name or password is incorrect or if other information is required but not provided, such as an operator's comment, the action will not be allowed and an error message will be displayed.

These activities are logged to FactoryTalk Diagnostics and can be viewed in the Diagnostics List or Diagnostics Viewer, depending on how they are set up. The information that will be logged includes user name, old value, new value, operator comments regarding why the change was made, and the name of the person who approved the change.

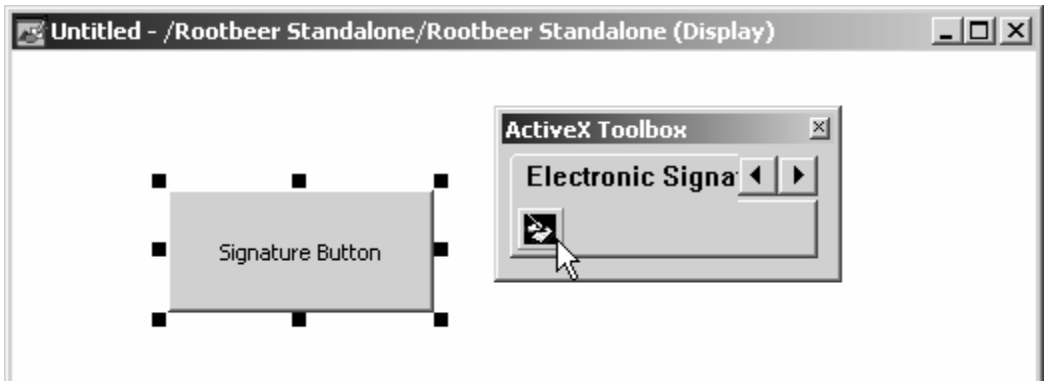
The Electronic Signature feature, along with others, such as RSView SE's "headless server", architecture which allows users to be logged in only at the client, enables critical operations to meet the security standards required for FDA 21 CFR Part 11 compliance.

Note: The control is meant to be used in a Windows Domain. Workgroup Uses may authenticate to it, but the control will not check Local Computer Group membership.

Creating an Electronic Signature Button

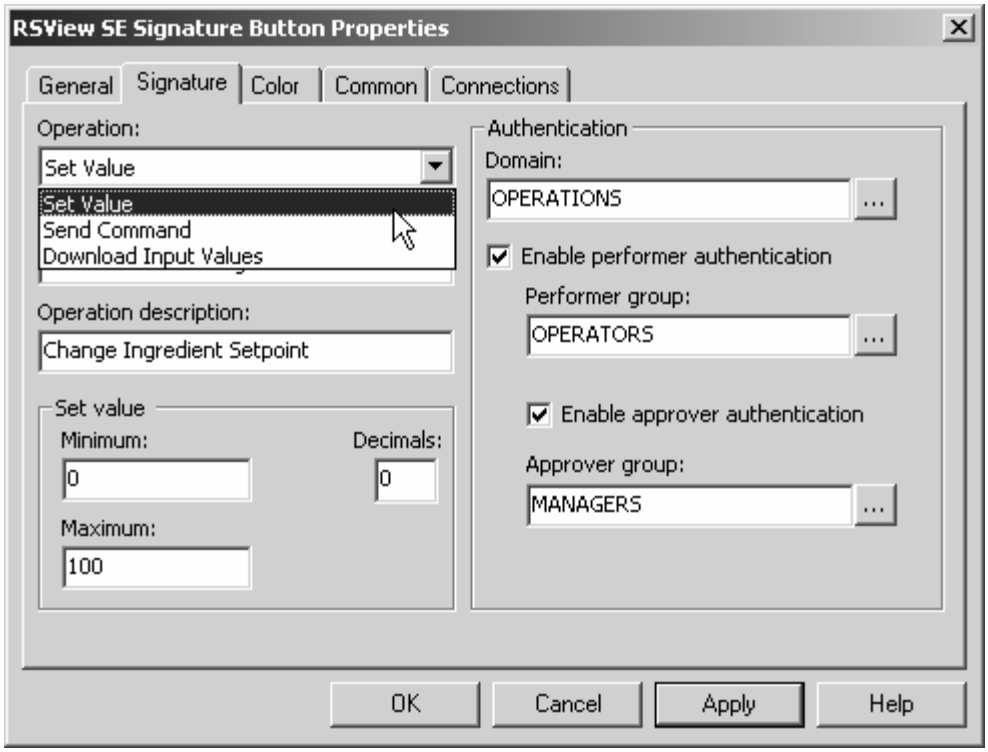
The Electronic Signature Button is an ActiveX control installed with RSView Studio.

Access it by opening a graphic display and then showing the ActiveX Toolbox from the View menu. Click on the Electronic Signature button in the toolbox to select it. Draw a button on the graphic display.



Note: The ActiveX Toolbox automatically includes the Electronic Signature Button. You may customize the toolbox to contain the ActiveX controls you use most often. Right-click on the toolbox to create new tabs, and new controls within the tabs.

You may configure the button to set a value, run an RSView command, or download all inputs on the graphic display. You may specify that the user downloading or authenticating the download come from a certain group in the domain.

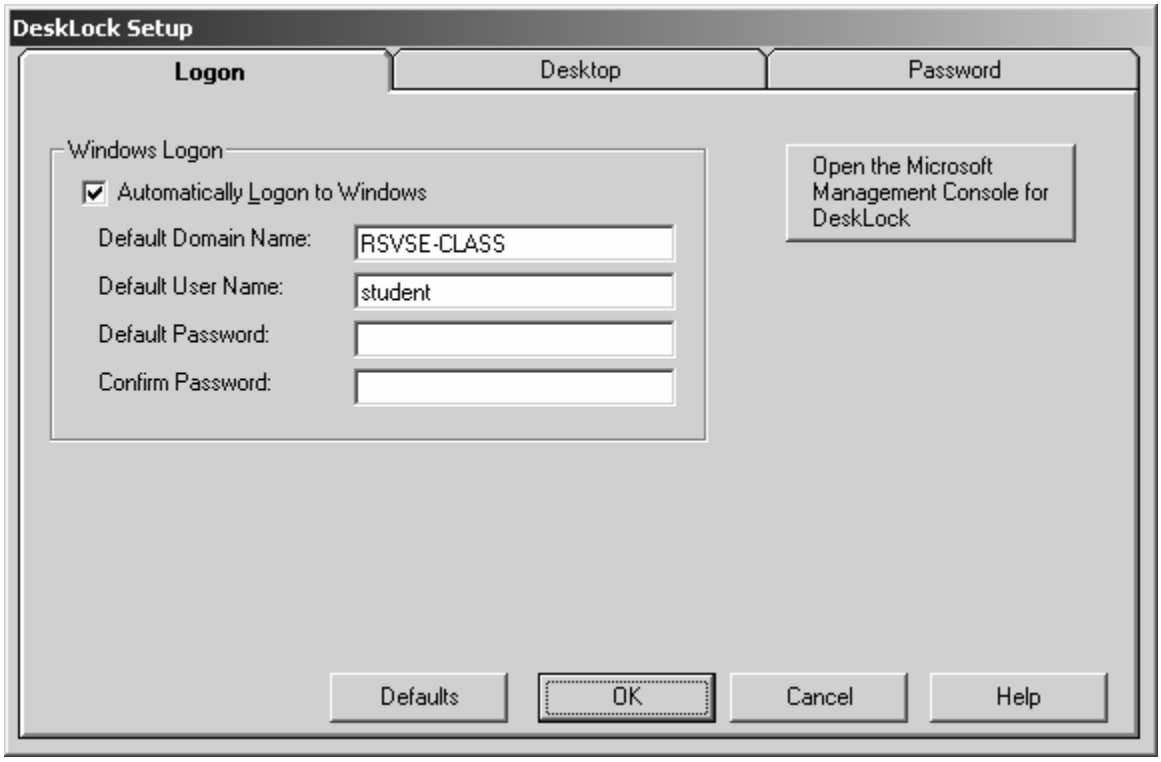


DeskLock

DeskLock is a utility included with RSView. It lets you configure a Windows 2000/XPcomputer so an operator only has access to the applications you select. DeskLock replaces the standard Window Desktop, preventing access to the Start button and desktop shortcuts.

Caution: DeskLock can have far-reaching effects on your operating system.

Open DeskLock (Start / Programs / Rockwell Software / RSView Enterprise / Tools / DeskLock). Click **Set Up DeskLock**. Check the box and provide logon information if you wish to automatically log into Windows. Click the box to open the Microsoft Management Console.

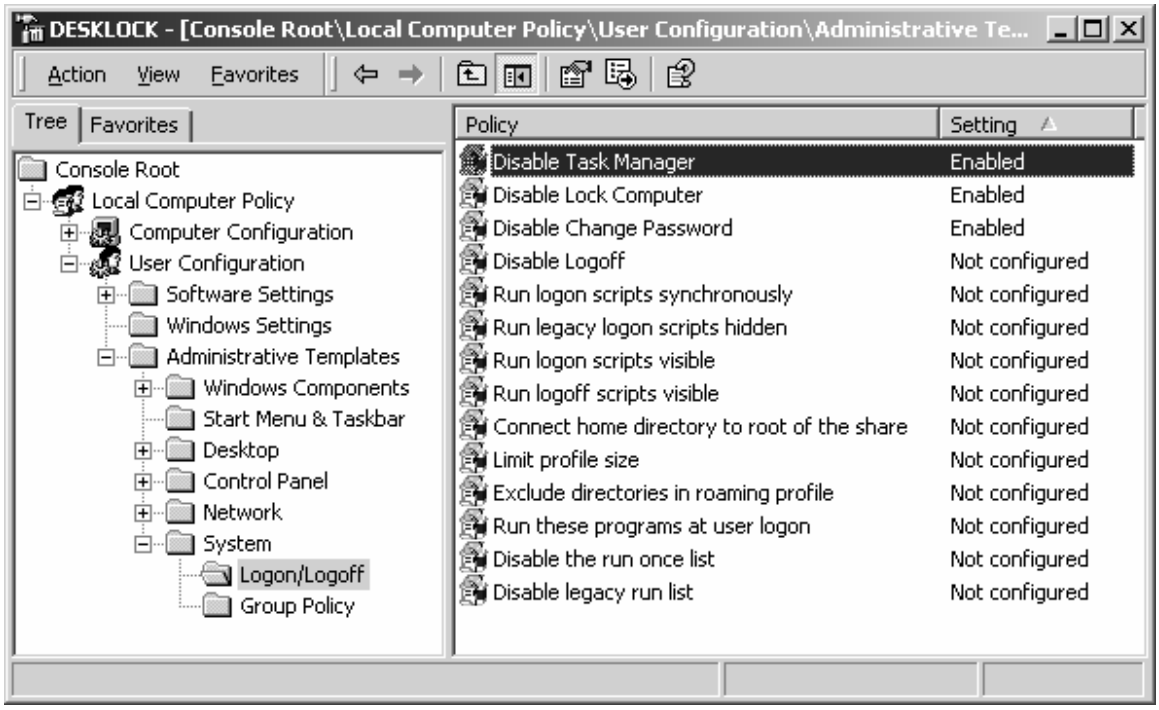


The Microsoft Management Console allows you to make specific settings to prevent users from accessing operating system functionality. The console opens by default to the `Console Root\Local Computer Policy\User Configuration\Administrative Templates\System\Logon/Logoff` folder. It is recommend that you enable the following items in this folder:

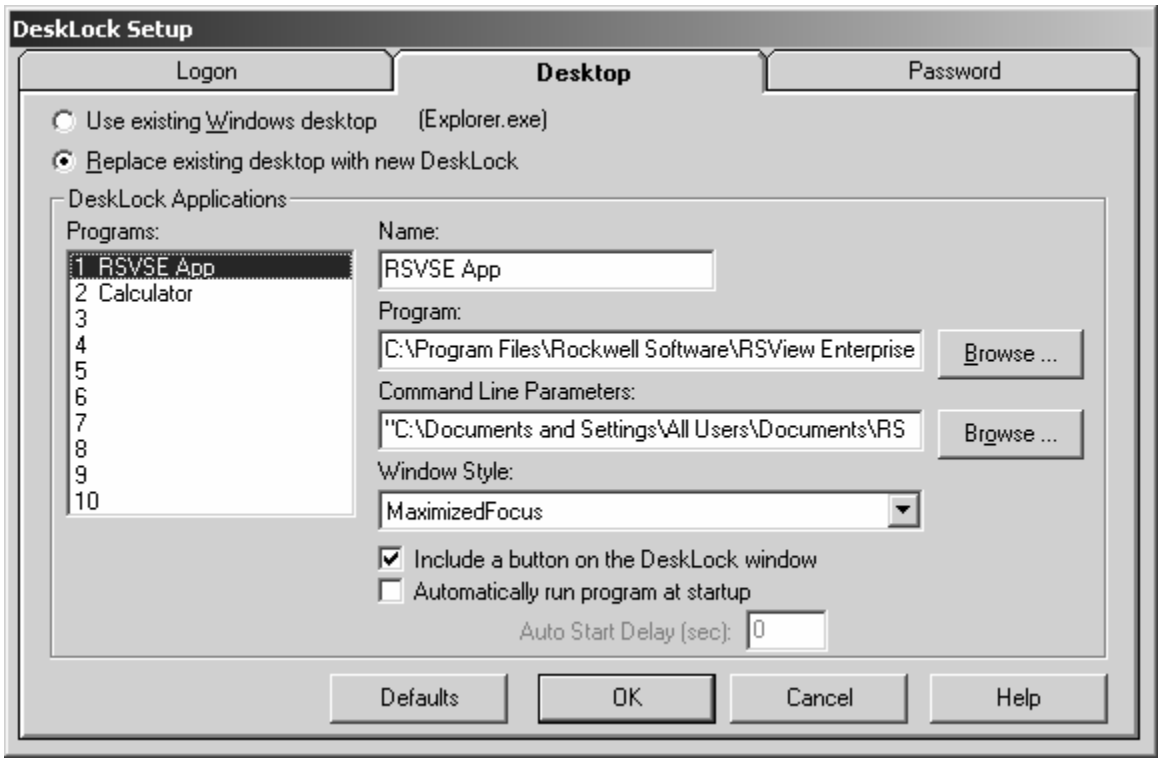
- Disable Task Manager
- Disable Lock Computer
- Disable Change Password
- Disable Logoff

In addition, the following item in the Start Menu and Taskbar folder should be enabled:

- Disable and remove the Shut Down command



Click on the **Desktop** tab to customize the desktop. Configure up to ten programs that an operator will have access to. The applications can be started automatically, and included on the DeskLock window that the operator has access to.



An RSView SE Client can be run automatically upon startup if configured here.

- Enter the path to MERuntime.exe in the program field.
  - `C:\Program Files\Rockwell Software\RSView Enterprise\DisplayClient.exe`
- Enter the path to the specific SE Client file (*.cli) in the Command Line
- Check **Automatically run program at startup**.

By automatically logging on to Windows and running the Machine Edition project at startup, the computer doesn't require any input from an operator.

Click the **Password** tab to password protect the **Restart Windows, Exit DeskLock,** and **Set Up DeskLock** buttons.

Lab 13 – Implementing Security

Objective: In this lab, you will implement security by configuring User Accounts and placing security codes on different HMI elements. You will add an electronic signature button to a display. You will test the security with an SE Client.

Software Requirements:

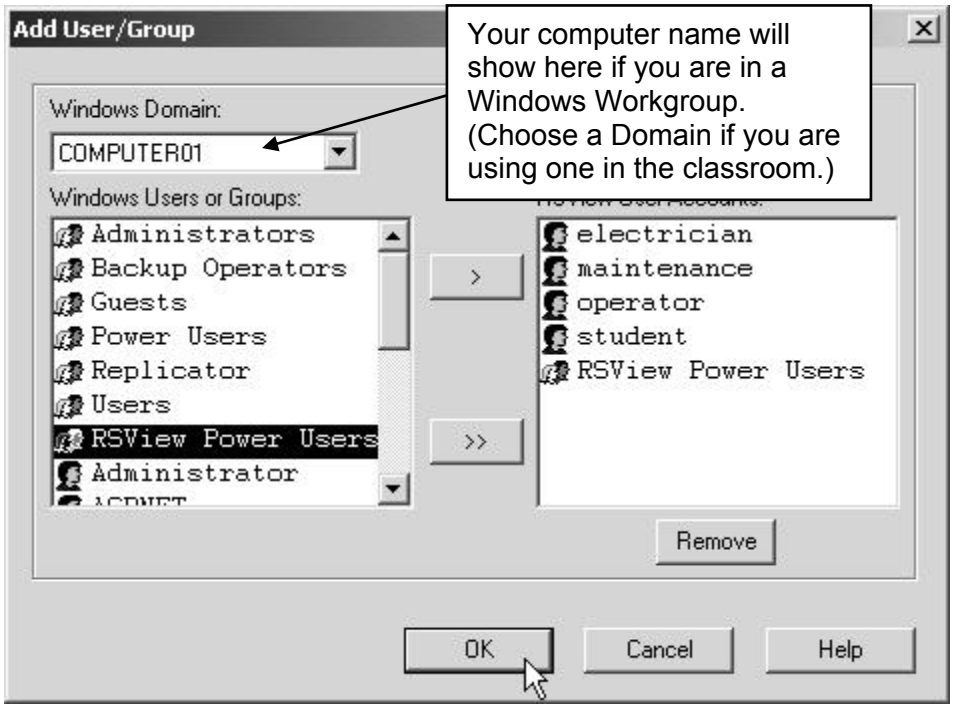
- RSView Studio
- SoftLogix 5860 running RSView_Class_SoftLogix program

1. Create RSView User Accounts

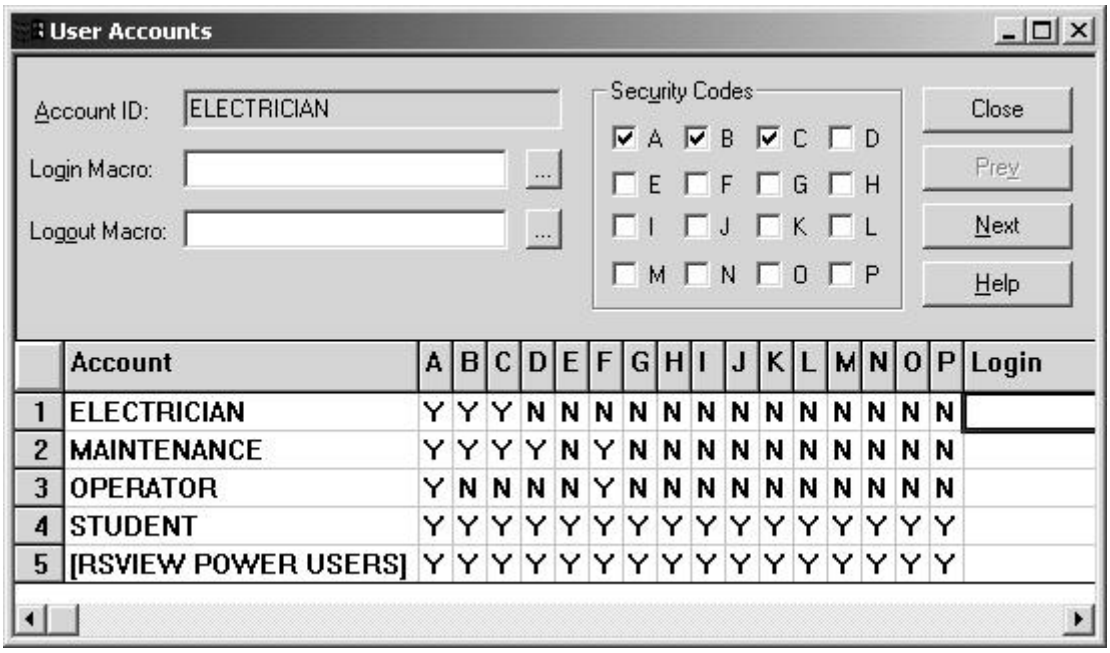
- These Windows accounts have been created on your computer. (Create them if they don't exist.)

User Name	Password
student	student
maintenance	main
engineer	eng
operator	oper
electrician	elec

- The Windows group **RSView Power Users** includes the Administrator and Engineer accounts.
- Open the User Accounts Editor. Click the Add Users/Groups button.
- Delete the **Administrator** account. Add the following Users and Groups:



- Configure the RSView Security Codes as follows:



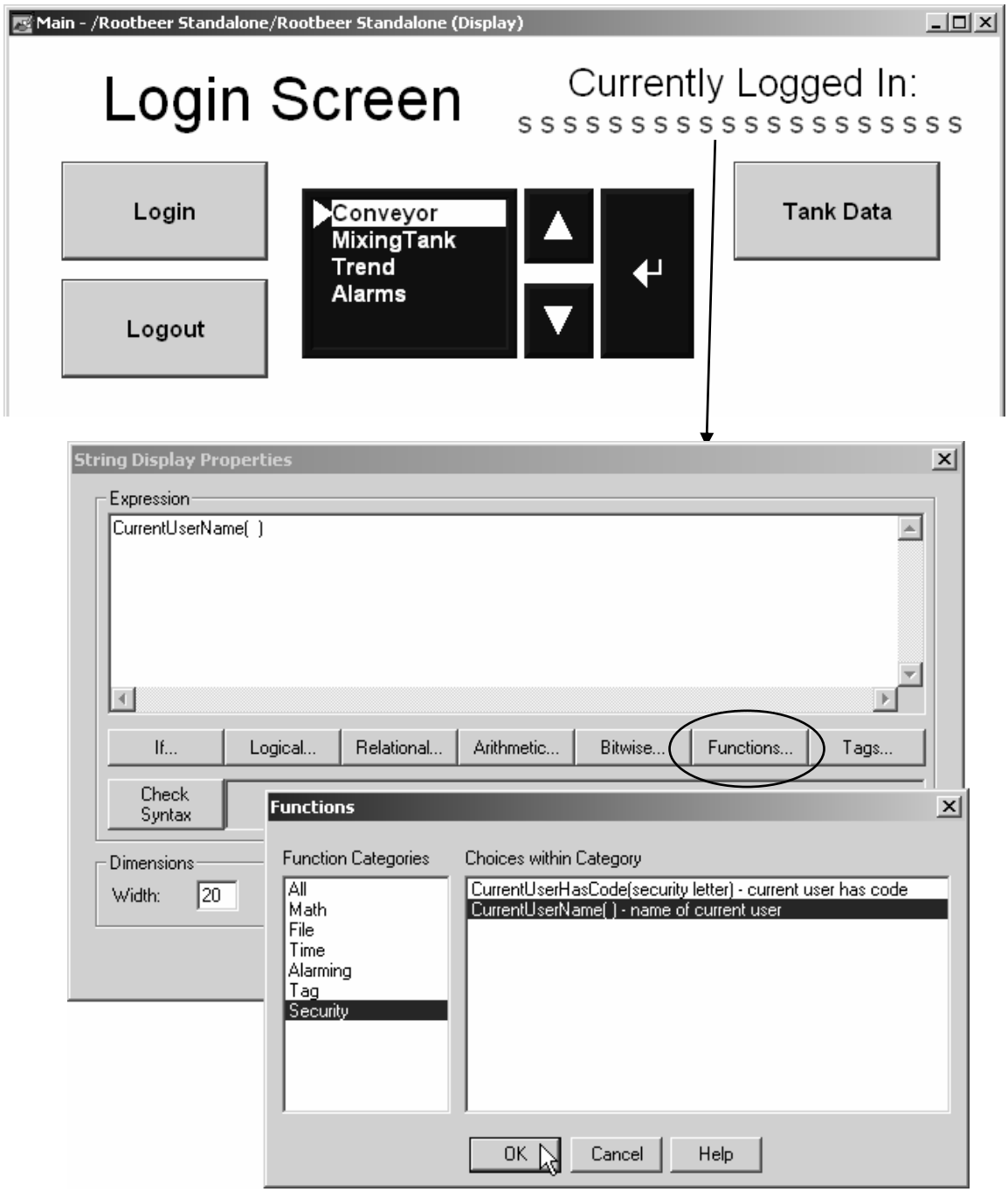
	Account	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Login
1	ELECTRICIAN	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	
2	MAINTENANCE	Y	Y	Y	Y	N	Y	N	N	N	N	N	N	N	N	N	N	
3	OPERATOR	Y	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	
4	STUDENT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
5	[RSVIEW POWER USERS]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

- Close and Save the User Accounts dialog box
- You will receive a warning because the current Windows user, **Administrator**, has been removed. Answer **OK** to the warning:

User Accounts
No users have the security code necessary to access the application.
To change the application access to all users, click OK.
To return to the user Accounts editor, click Cancel.
OK
Cancel

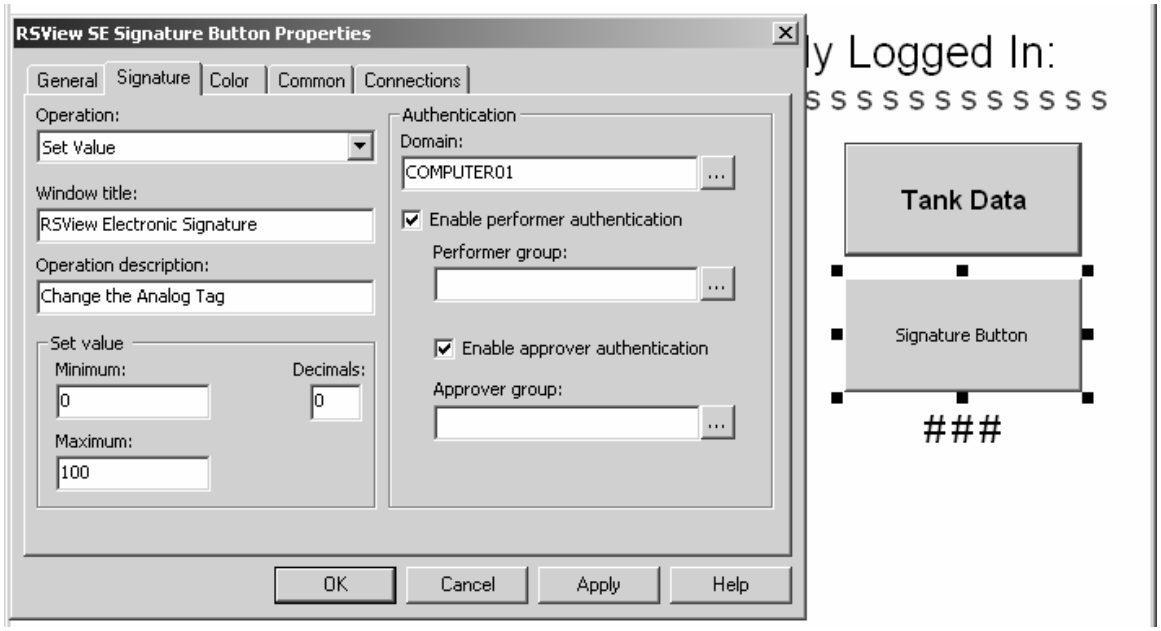
2. Build a new graphic display in your HMI Project

- Include the following elements:
    - o Text “Login Screen”, “Currently Logged In:”
    - o String Display, `CurrentUserName( )` function (see below)
    - o RSView button, `Login` command
    - o RSView button, `Logout` command
    - o RSView button, `Display TankData /Ttank_1` command
    - o Display List Selector
    - o Move Up, Move Down, and Enter buttons
    - o Save the graphic as **Main**



3. Add an Electronic Signature Button

- Open the ActiveX Toolbox from the View menu. Add an Electronic Signature Button under the Tank Data button.



- Configure the signature button:
    - General Tab - Caption = **Secure Setpoint**
    - Signature Tab - Domain = <**your computer name**>
    - enable performer and approver authentication, but don't specify a group. (this works for Windows Domains only)
    - Connections Tab - Value = **mem\analog**

- Create a Numeric Display below the Signature Button to show the value of **mem\analog**.

4. Edit your existing Displays and Tags

- Edit each of the Displays referenced in the Display List Selector and the Tank Data Display. Add a button to Display the Main graphic.

- Edit the Display Settings of the Existing graphics:
    - Restrict the **TankData** graphic so **Operators** may not access it, but all others can.
    - Restrict the **Alarms** graphic so **Electricians** may not access it, but all others can.

- Edit HMI Tag Security:
    - Restrict **Operators** from changing the values in the **Alarm** graphic. Put security on the **Alarms\digital1** and **Alarms\analog1** HMI Tags, not the graphic.

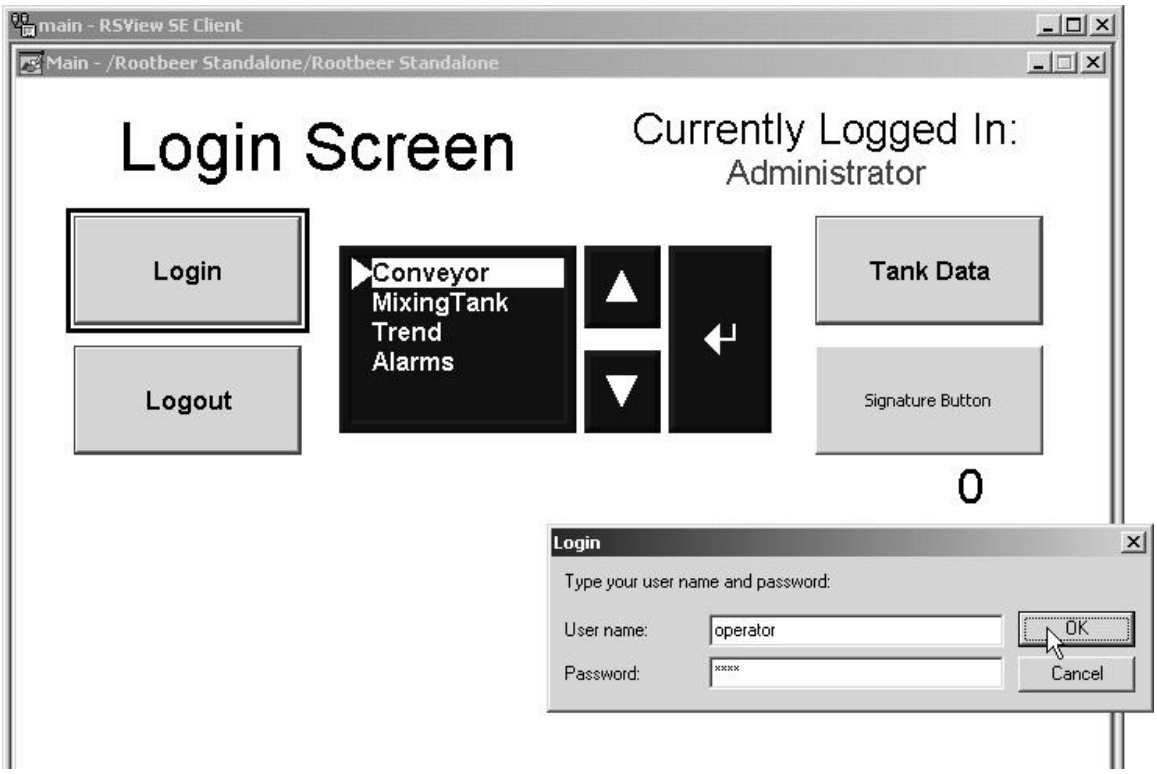
5. Apply security to commands

- Open the Secured Commands editor and deny the **Maintenance** user access to the `AppStart` and `Invoke` commands.

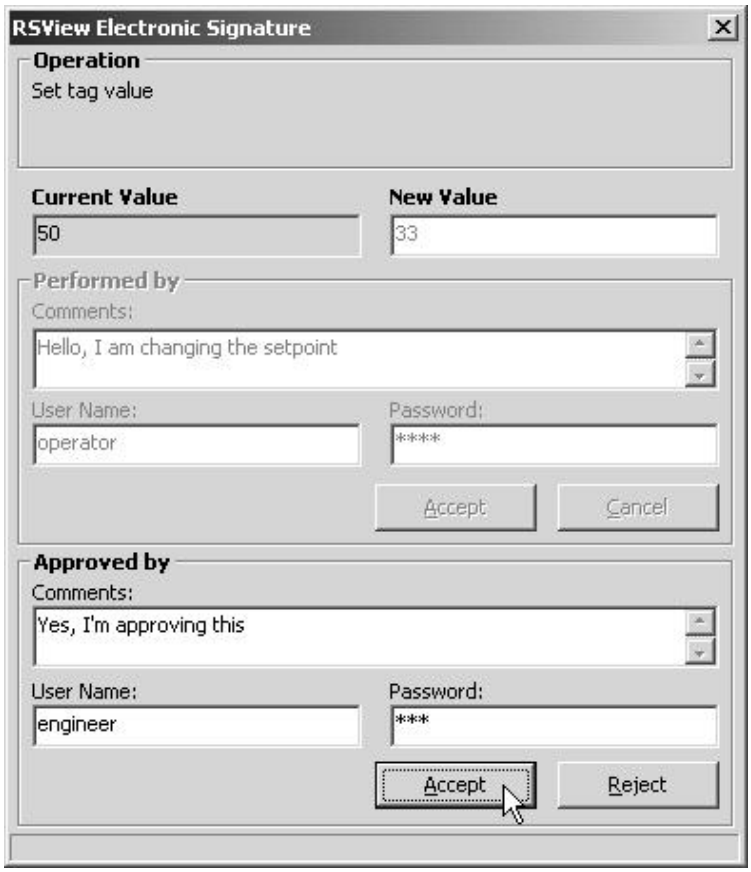
6. Create and Run an SE Client to Test Security

- Create a new SE client. Use the **Main** graphic in your area as the initial graphic.
- Don't run any macros, key files or parameter files.
- Force the client session to log out after 2 minutes of inactivity.
- Run the client.

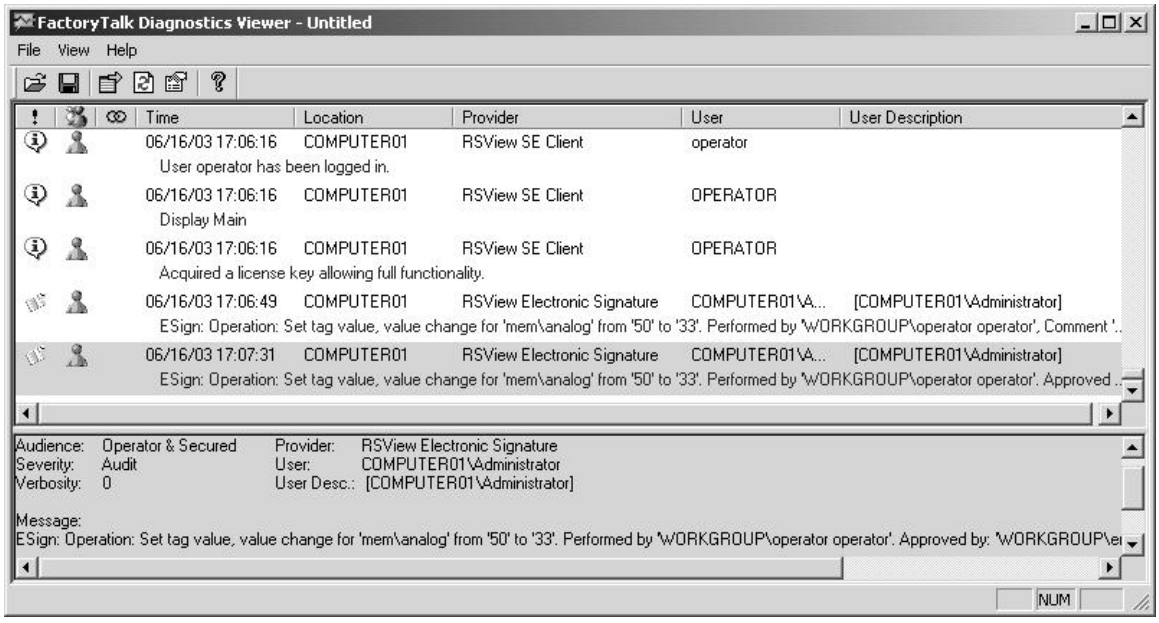
- Note the string display shows the currently logged on user. The Windows user is automatically the initial RSView user.
- The logged on user is **Administrator**, even though you removed that account. It is valid because Administrator is part of the **RSView Power Users** group.
- You should be able to log in as **Engineer** for the same reason, even though that account is not in the RSView Users list.



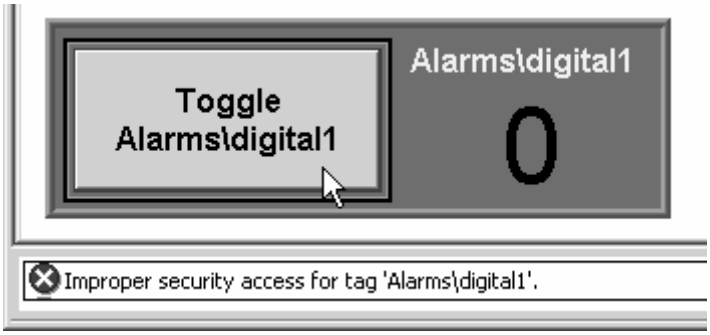
- Login as **Operator**
- Test the electronic signature button. Validate as **Operator**, and Approve it with the **Engineer**.



Open the FactoryTalk Diagnostics Log to view the documentation of the setpoint download.


FactoryTalk Diagnostics Viewer - Untitled
File View Help
Time Location Provider User User Description
06/16/03 17:06:16 COMPUTER01 RSView SE Client operator
User operator has been logged in.
06/16/03 17:06:16 COMPUTER01 RSView SE Client OPERATOR
Display Main
06/16/03 17:06:16 COMPUTER01 RSView SE Client OPERATOR
Acquired a license key allowing full functionality.
06/16/03 17:06:49 COMPUTER01 RSView Electronic Signature COMPUTER01\A... [COMPUTER01\Administrator]
ESign: Operation: Set tag value, value change for 'mem\analog' from '50' to '33'. Performed by 'WORKGROUP\operator operator', Comment '..
06/16/03 17:07:31 COMPUTER01 RSView Electronic Signature COMPUTER01\A... [COMPUTER01\Administrator]
ESign: Operation: Set tag value, value change for 'mem\analog' from '50' to '33'. Performed by 'WORKGROUP\operator operator'. Approved ..
Audience: Operator & Secured
Severity: Audit
Verbosity: 0
Provider: RSView Electronic Signature
User: COMPUTER01\Administrator
User Desc.: [COMPUTER01\Administrator]
Message:
ESign: Operation: Set tag value, value change for 'mem\analog' from '50' to '33'. Performed by 'WORKGROUP\operator operator'. Approved by: 'WORKGROUP\e
NUM

- Remain logged in as **operator**. Test your access to
    - the **Tank Data** graphic
    - the alarm tags in the **Alarm** graphic



- Click the **Login** button. Login as **maintenance**. Test your access to
    - the Ctrl-C key to start the calculator in the **Conveyor** graphic
    - the **Clear Trend** button in the **Trend** graphic
- Click the **Login** button. Login as **electrician**. Test your access to
    - the **Alarms** graphic
- Click the **Logout** button. What effect did it have? Close the client when you are done troubleshooting.

This Lab is Finished.

13. *VBA Display Code*

Objectives:

- Understand how Visual Basic for Applications is used within RSView SE
- Open the VBA IDE (Integrated Design Environment)
- Familiarize yourself with the SE Client Object Model
- Write VBA code to interact with SE Client Displays

Note – VBA is a very extensive subject. This chapter will serve as an introduction.

VBA in RSView SE

Visual Basic for Applications is a Microsoft Programming language embedded in RSView Studio. You have the ability to write code against graphic display objects to customize and extend the capabilities of the RSView SE Client.

The code is written in RSView Studio, but is part of the graphic display. The code is executed as part of the display in an SE Client.

Some ways you might use VBA include:

Using data with other applications: If you regularly require RSView data for use in programs such as Microsoft Excel, or SQL Server, consider using the RSView SE Client object model and display code with VBA to integrate these applications with RSView.

Creating custom forms for operators: You can use VBA to create custom forms, for example as pop-up dialog boxes that operators can interact with at run time. You can also use VBA logic to validate the operator's input, for example to ensure that the value an operator enters in a numeric input field falls within 10% of the value of another numeric input field.

Designing intuitive graphic displays: Use the RSView SE Client object model to populate ActiveX controls with data, for use in graphic displays. For example, use list boxes or combo boxes in graphic displays to allow operators to select options such as recipe items.

Manipulating the RSView SE Client window: Write VBA code to arrange graphic displays based on the size of the RSView SE Client window. This allows you to adapt your application dynamically to various screen desktop sizes and resolutions.

Sending custom messages to the activity log file: Send specific messages to the activity log window and activity log file, to record the operation conditions and events through VBA code.

Securing the system: The RSView SE Client Object Model allows you to obtain security information about who is using the system, and to use the security information and events to control access to the system. For example, you can restrict a user's access to a graphic display on a secured computer by creating code that displays the graphic display on a workstation where the user is logged in with a particular security code.

The SE Client Object Model

The RSView SE Client object model provides a way to manipulate the graphic objects in a display at run time. Using the Microsoft VBA IDE (Visual Basic for Applications Integrated Design Environment) you can write display code that uses the Graphic objects in the SE Client object model to interact with the objects in displays at run time, as well as load, hide, and unload displays.

You cannot create new graphic objects or edit existing objects with the SE Client object model. Any changes you make to a display and its objects at run time are not saved. For example, if you change the position of an object in a display, the next time the display is loaded, the object will be in its original position. This does not apply to ActiveX controls which might save property changes after a test-run has changed them.

Objects have three attributes:

- **Properties** - named characteristics and values of an object such as Value, Enabled, and Caption.

  For example, a Tag object has a **Value** property to return or set the value of a tag.

- **Methods** - functions implemented in an object that allow external actions to change the object's appearance, behavior or properties. A call to a method might be made in response to events from other objects and could trigger other events.

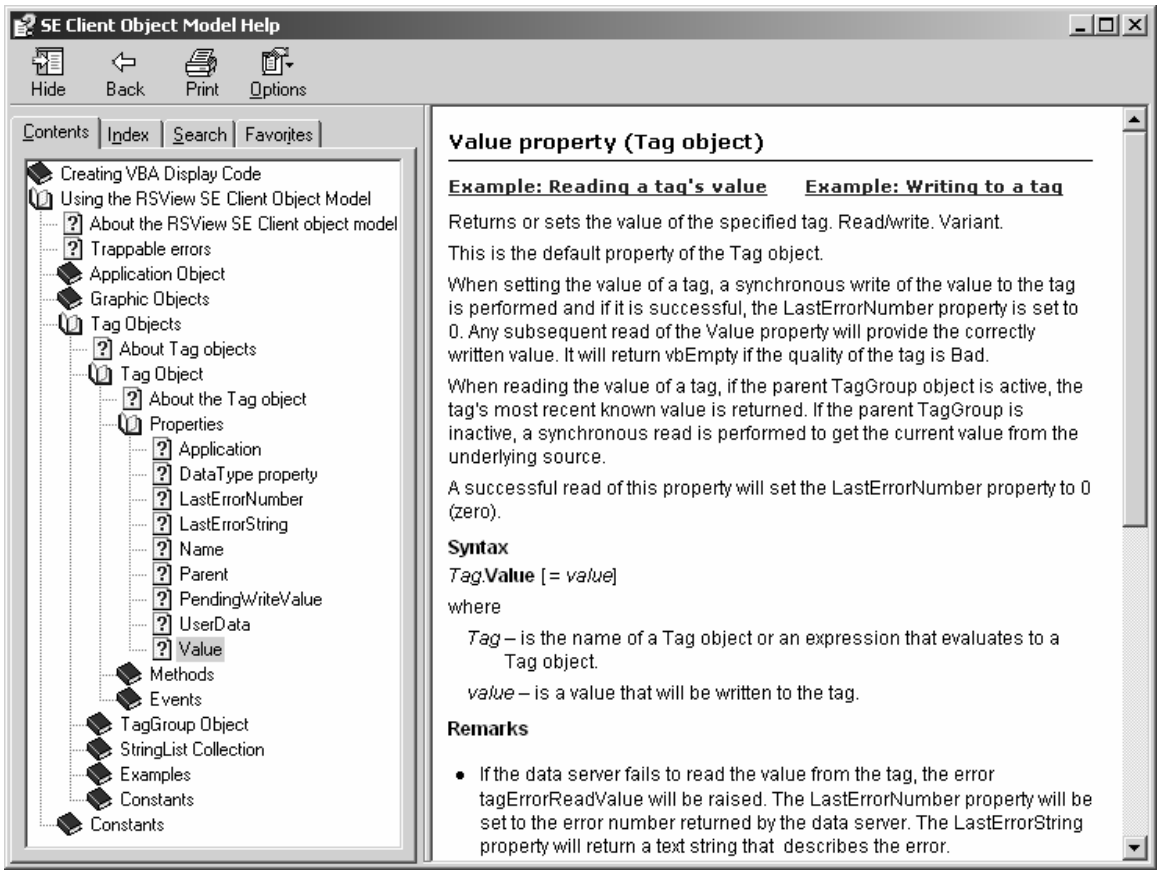
  For example, a Tag object has a **GetTagData** method to read the data for a tag and return the information as parameter variables.

- **Events** - actions triggered by an object in response to an external action on the object such as a mouse click.

  For example, the Tag object has a **Change** event – code may be executed automatically when the value of a tag changes.

Learning about the object model

The RSView Studio Help system has information on the Object Model:


SE Client Object Model Help
Hide
Back
Print
Options
Contents
Index
Search
Favorites
Creating VBA Display Code
Using the RSView SE Client Object Model
About the RSView SE Client object model
Trappable errors
Application Object
Graphic Objects
Tag Objects
About Tag objects
Tag Object
About the Tag object
Properties
Application
DataType property
LastErrorNumber
LastErrorString
Name
Parent
PendingWriteValue
UserData
Value
Methods
Events
TagGroup Object
StringList Collection
Examples
Constants
Constants
Value property (Tag object)
Example: Reading a tag's value
Example: Writing to a tag
Returns or sets the value of the specified tag. Read/write. Variant.
This is the default property of the Tag object.
When setting the value of a tag, a synchronous write of the value to the tag is performed and if it is successful, the LastErrorNumber property is set to 0. Any subsequent read of the Value property will provide the correctly written value. It will return vbEmpty if the quality of the tag is Bad.
When reading the value of a tag, if the parent TagGroup object is active, the tag's most recent known value is returned. If the parent TagGroup is inactive, a synchronous read is performed to get the current value from the underlying source.
A successful read of this property will set the LastErrorNumber property to 0 (zero).
Syntax
Tag.Value [= value]
where
Tag – is the name of a Tag object or an expression that evaluates to a Tag object.
value – is a value that will be written to the tag.
Remarks
If the data server fails to read the value from the tag, the error tagErrorReadValue will be raised. The LastErrorNumber property will be set to the error number returned by the data server. The LastErrorString property will return a text string that describes the error.

The Help system goes into detail about each Object, and its Properties, Methods and Events.

The VBA IDE

The Microsoft VBA IDE (Visual Basic for Applications Integrated Design Environment) lets you write, edit, test run, and debug code.

To open it do one of the following:

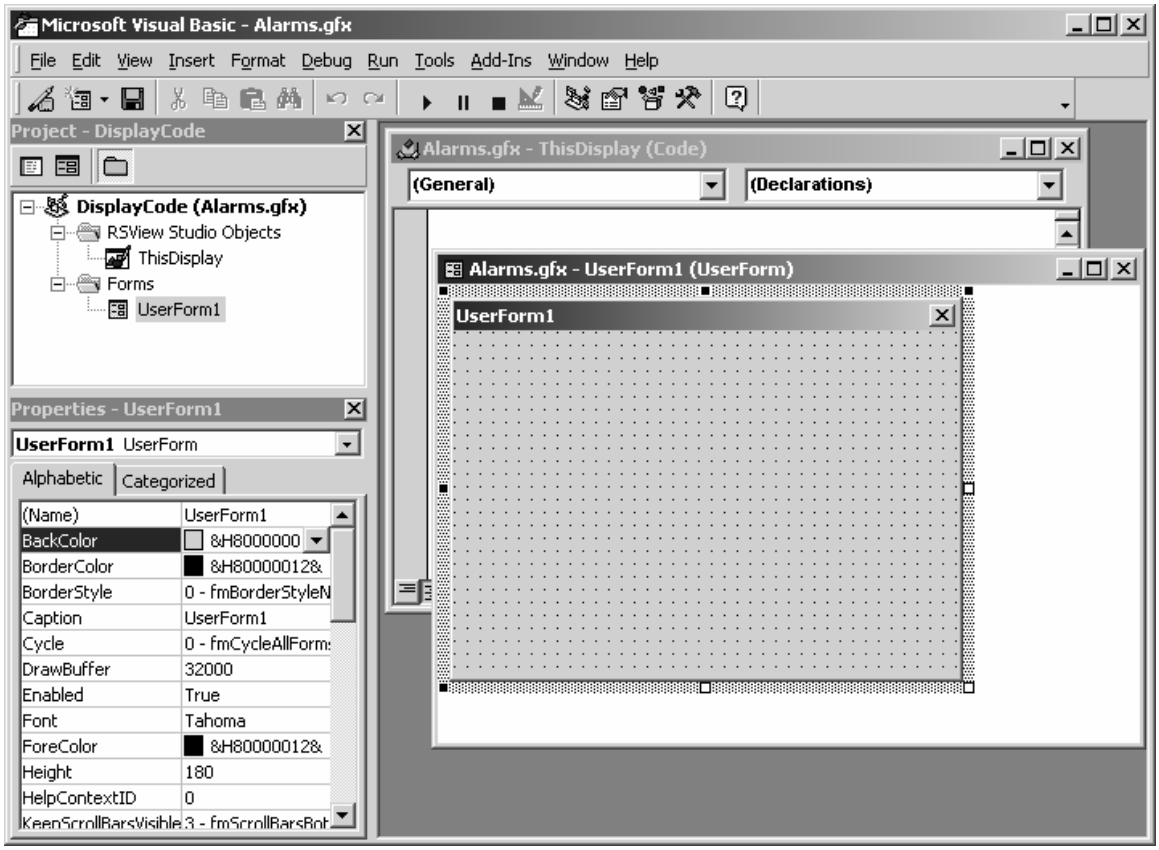
select **Visual Basic Editor** from the **View** menu in the Application Explorer

select **VBA Code...** from the Edit menu in the Graphics Display editor

right-click on a display when it is open in the Graphics Display editor, and then select **VBA Code...** from the context menu

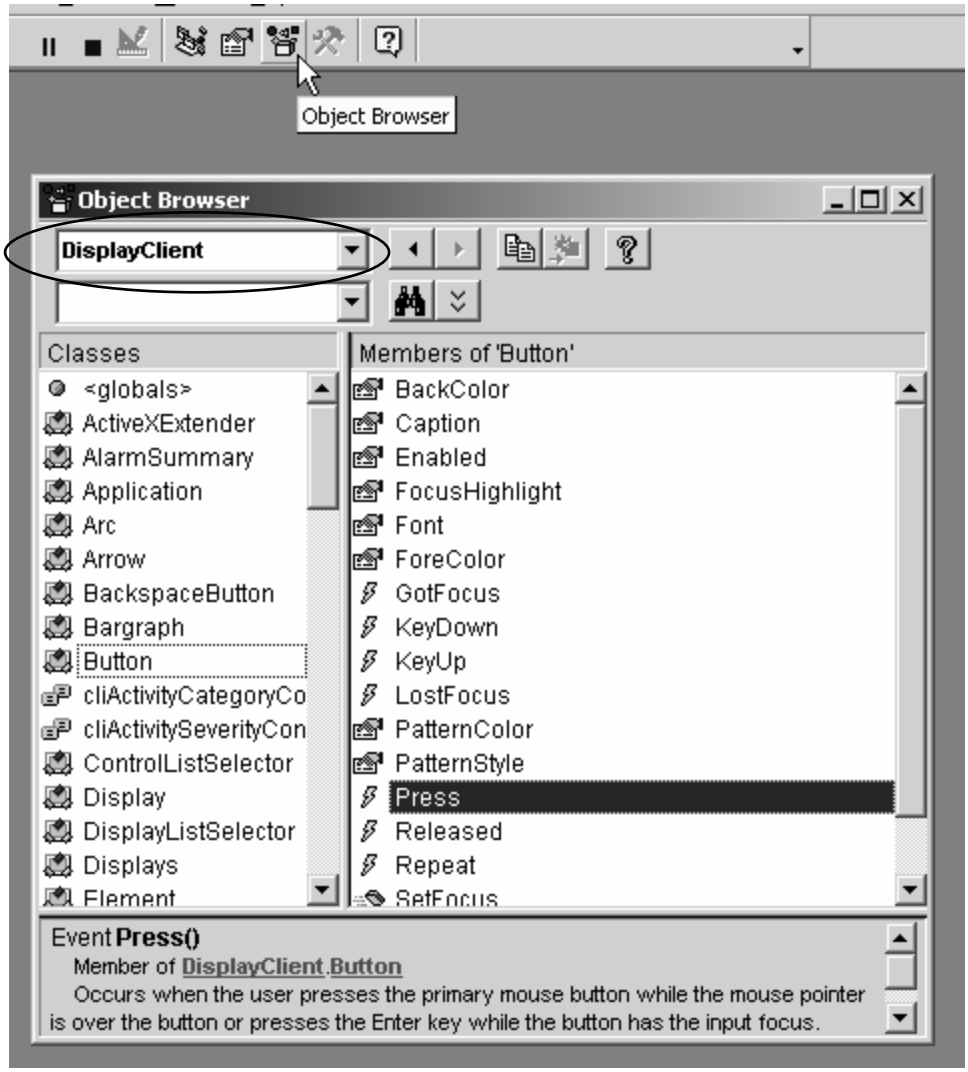
right-click on an element in a display and then select **VBA Code...** from the context menu

The VBA IDE consists of a project explorer, properties window, and code window.



Another way to get help on the Object Model is to show the Object Explorer in the IDE.

Select **Object Explorer** from the **View** menu, use the F2 keyboard shortcut, or click the **Object Explorer** toolbar button

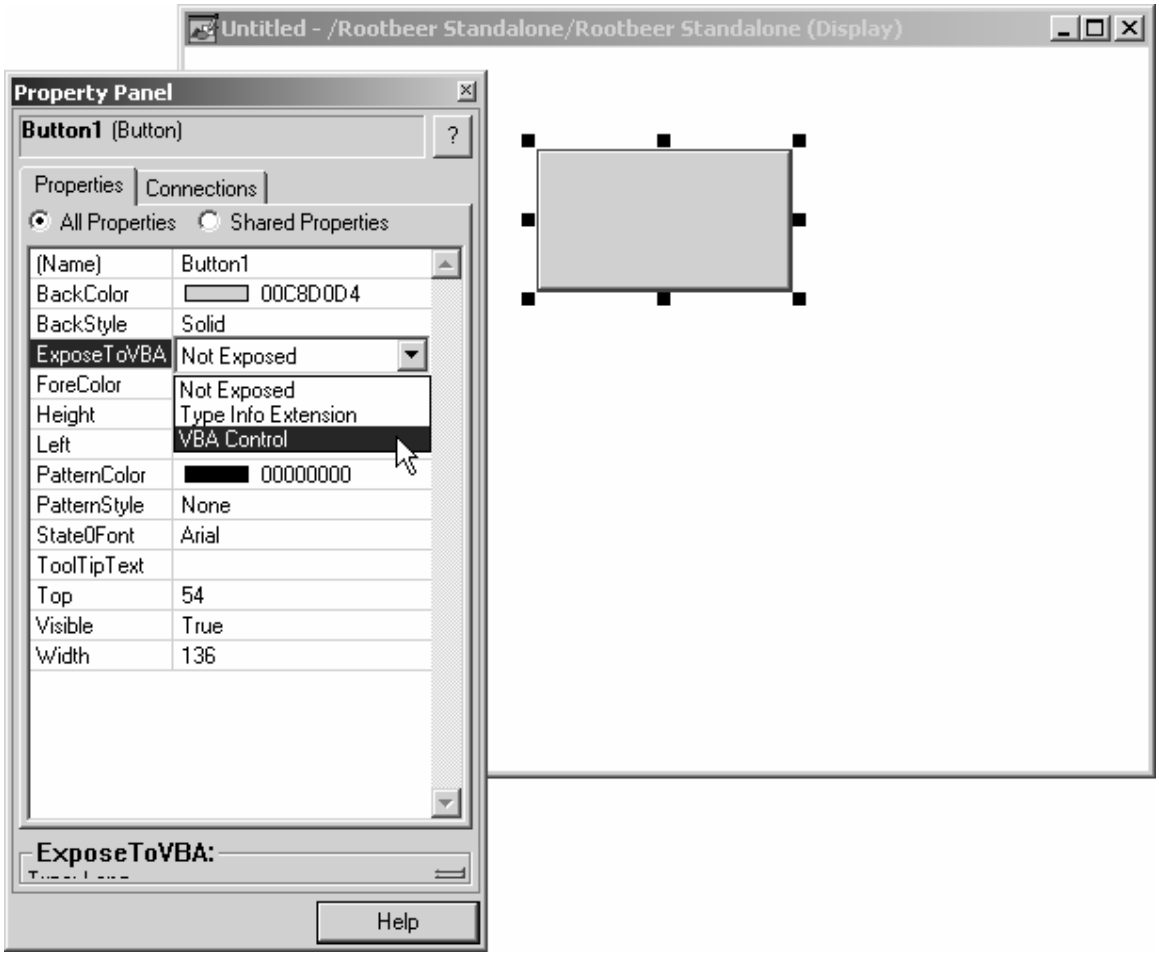


Select the relevant Library from the dropdown box. Clicking on an object in the left pane will display that object's properties, methods and events in the right pane.

Clicking the Help button (the question mark) will open the Help file specific to your selection.

Working with Objects in VBA Code

By default when an object is added to a Graphic display, it is not exposed as a property of the display and it does not appear in the combo box of the code window in VBA because the object's ExposeToVBA property is set to Not Exposed. This property is provided to improve the performance of loading, editing, and saving displays containing large numbers of objects. The more objects that are exposed as VBA controls, the longer it takes to load a display.



To expose an object as a property of a display or to write an event handler:

- Right-click on the object in the Graphics editor and select VBA Code.

  This will change the value of the ExposeToVBA property from Not Exposed to VBA Control, if the object exposes events, or to Type Info Extension, if the object does not expose events.

- Right-click object in the display in the Graphics Display editor and select Property Panel from the context menu.

  Change the ExposeToVBA property from Not Exposed to VBA Control or to Type Info Extension.

Lab 14 – Creating VBA Display Code

Objective: In this lab, you will create a graphic display, add some objects, and write code for those objects.

This is a very rudimentary introduction to VBA code writing. Error Handling, a very important part of writing code, is not covered. Debugging is also not covered – ask your instructor for help if the code has errors.

Try typing the code in to get a feel for the VBA IDE. If you wish to see the finished code, it is in a text file:

`\Supervisory Edition Class Files\VBA lab.txt`

Software Requirements:

- RSView Studio
- SoftLogix 5860 running RSView_Class_SoftLogix program

Part A

1. Create a new graphic display

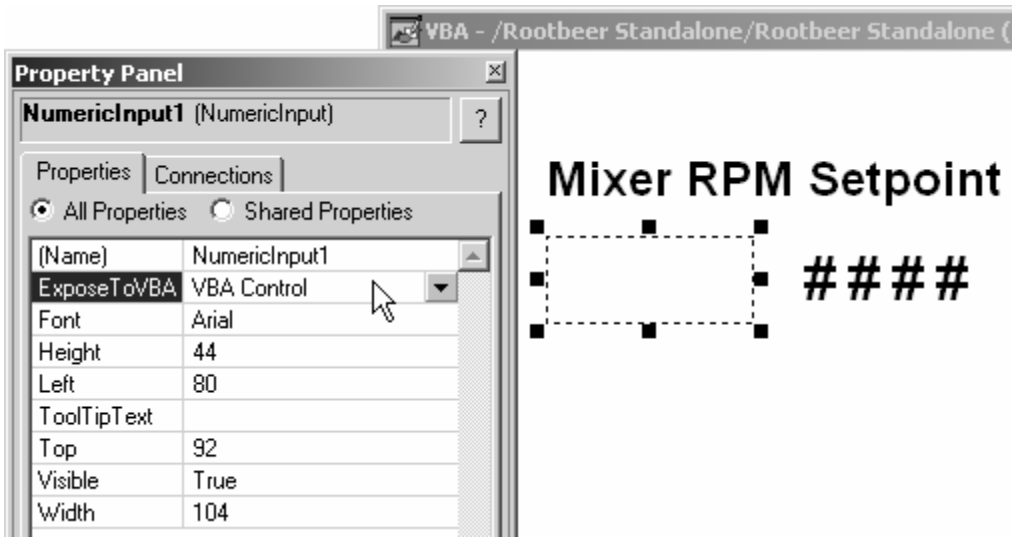
- Create a new display and include the following elements
    - Text, “Mixer RPM Setpoint
    - Numeric Input
    - Numeric Display
- Attach Numeric Input and Display to the tag:

`{::[RSView_Class_SoftLogix]Program:Mixing.Mixer_rpm_setpoint}`

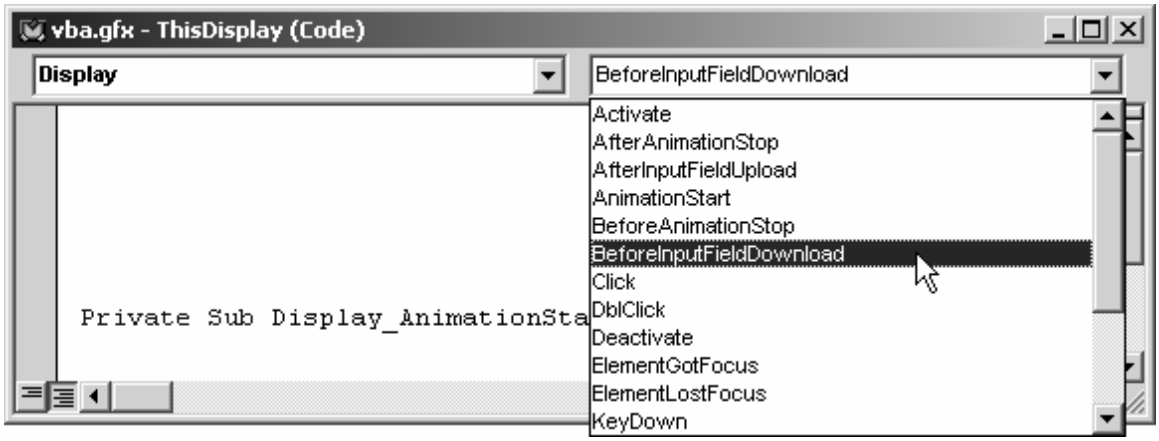
- Name the graphic display **VBA**

2. Write VBA Code

- Write code to evaluate the operator input. You do not want to download any value outside the safe range: 0-1740 RPM. Data Server OPC tags do not have a high and low limit associated with them (unlike HMI tags), so we can check the value with VBA.
- Expose the NumericInput object to VBA. Right-click on it and select Property Panel. Change the ExposeToVBA property to **VBA Control**. Close the Property Pane.

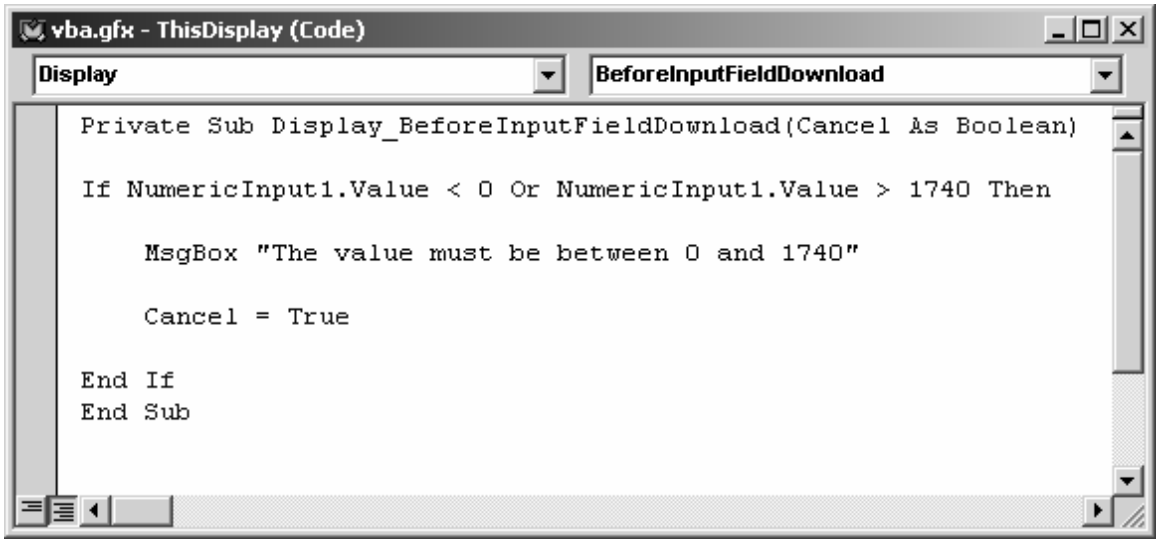


- Right click in some open space in the graphic and select **VBA Code** to open the VBA IDE (editor).
- By default, the code window will open to the **Display** object, **AnimationStart** event.
- The value should be checked before it has been downloaded to the controller. Select the **BeforeInputFieldDownload** event of the Display object. Code will execute upon this event.



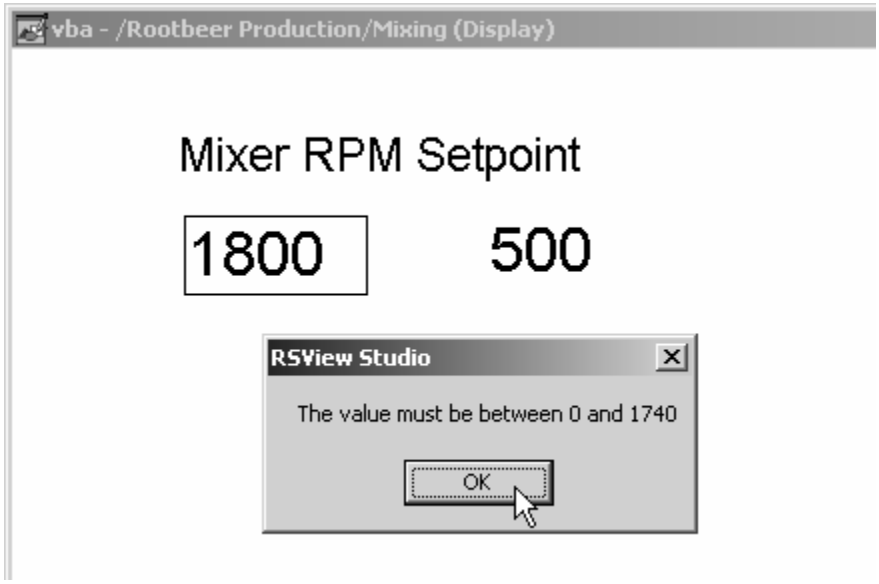
- Write the following code within the subroutine:

```
If NumericInput1.Value < 0 Or NumericInput1.Value > 1740 Then

    MsgBox "The value must be between 0 and 1740"
    Cancel = True

End If
```



3. Test the code

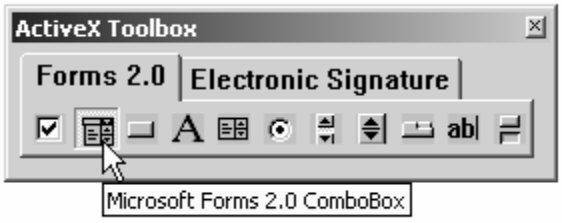
- Test the display back in RSView Studio.
- Enter values in the numeric input. Return to the VBA editor if the code fails.



Part B

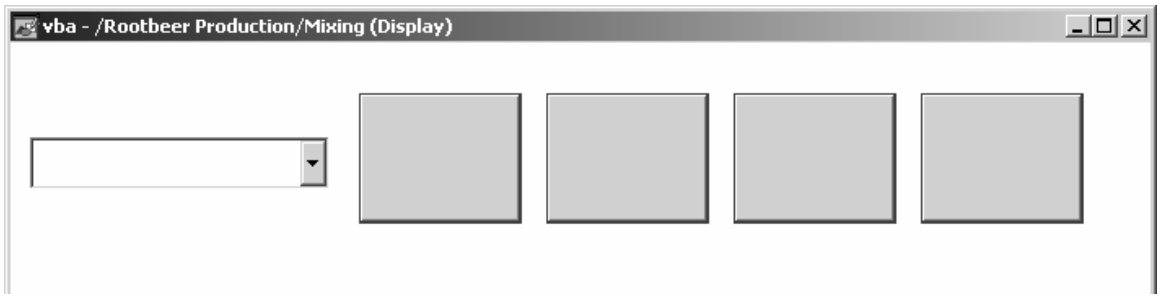
More VBA – Working with an ActiveX control

- This next section will use RSView pushbuttons and a Microsoft ComboBox ActiveX control. The buttons will be enabled by selecting an entry from the ComboBox. The ComboBox will be populated automatically by VBA code.
- The ComboBox is part of a group of Microsoft Forms ActiveX controls. Show these by selecting **ActiveX Toolbox** from the **View** menu.

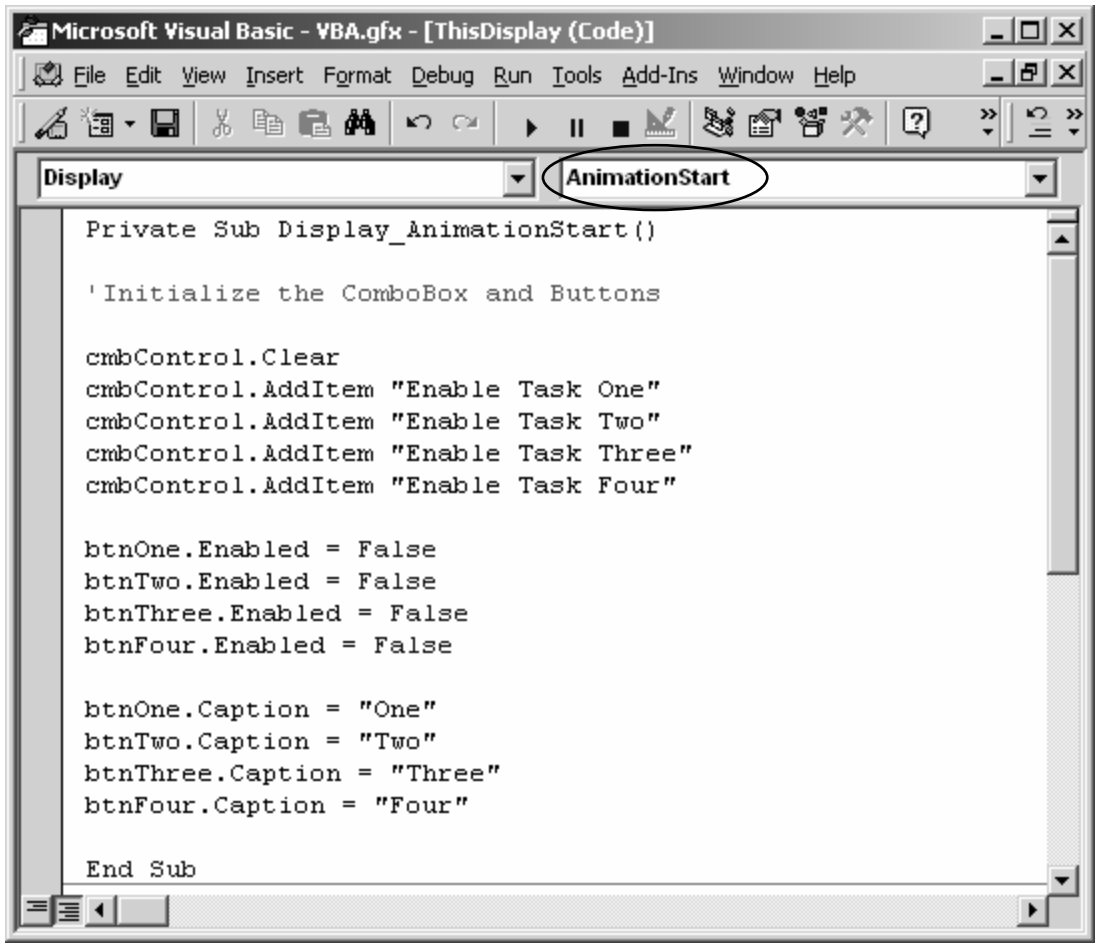


- Select the ComboBox control and draw one on the graphic display.

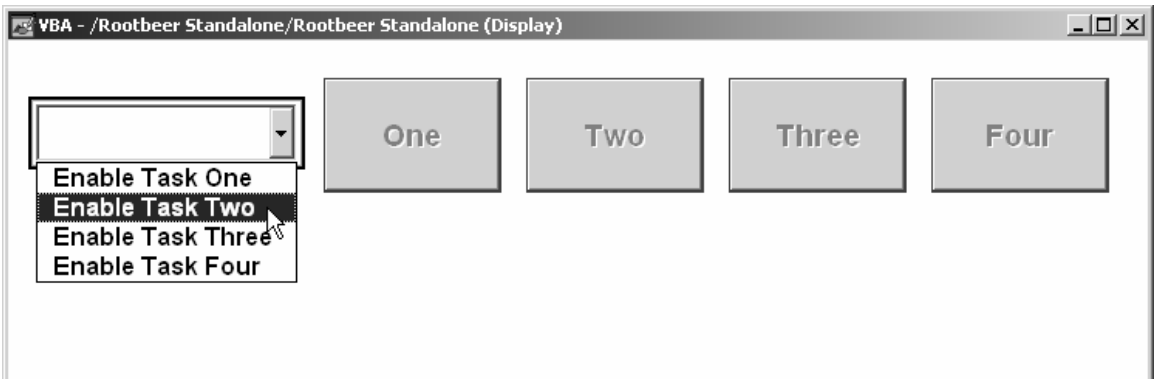
- Use the same **VBA** graphic from the last exercise. Add four RSView Buttons. Do not configure these.



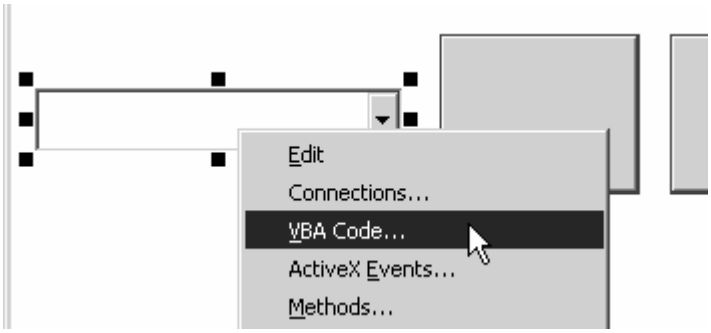
- Open the Property Panel. Select all the objects and change their ExposeToVBA property to **VBA Control**.
- Keep the Property Panel open. Change the ComboBox name to **cmbControl** and Buttons to **btnOne** through **btnFour**.
- Right-click in the graphic to bring up the VBA editor. Write code to populate the ComboBox, and give the buttons captions when the **display animation starts**.



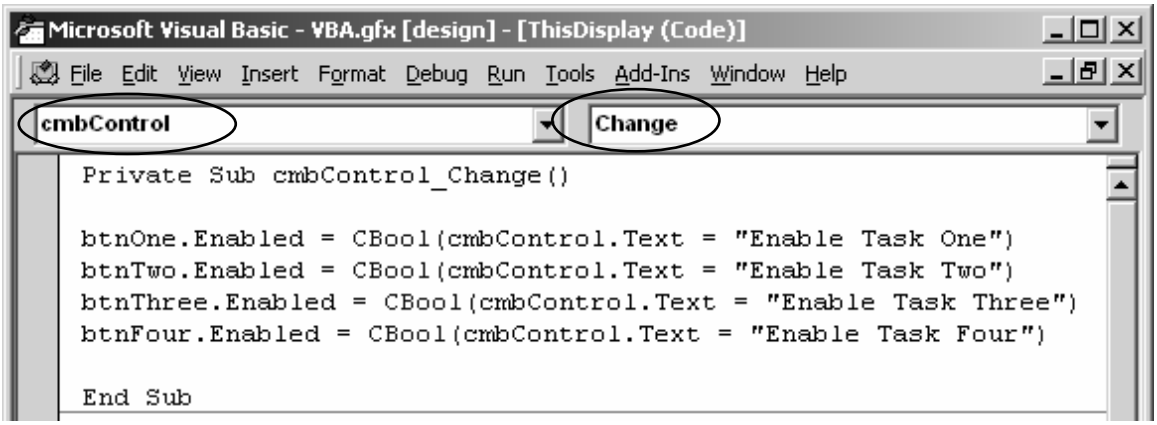
- Test the ComboBox in the graphic.



- Add more code to **enable** a button only when it has been selected from the ComboBox. This code will be tied to the **Change** event of the ComboBox.
- Stop the Display Test. Right-click on the ComboBox and select VBA Code

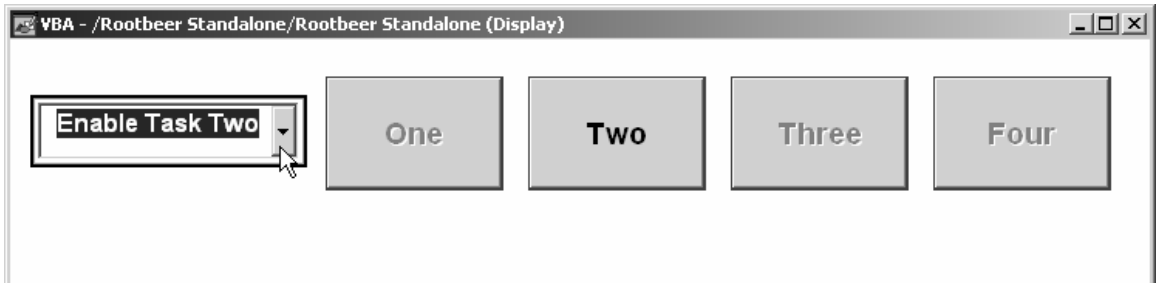


- This will automatically take you to the Change event (the default) of the ComboBox object.
- Enter code to enable the buttons:


Microsoft Visual Basic - VBA.gfx [design] - [ThisDisplay (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
cmbControl
Change
Private Sub cmbControl_Change()
btnOne.Enabled = CBool(cmbControl.Text = "Enable Task One")
btnTwo.Enabled = CBool(cmbControl.Text = "Enable Task Two")
btnThree.Enabled = CBool(cmbControl.Text = "Enable Task Three")
btnFour.Enabled = CBool(cmbControl.Text = "Enable Task Four")
End Sub

Hint - `cBool` is a VBA function that returns a 0 or 1 based on the expression in parentheses. For more help in VBA, select the item you want help on and use the F1 key on the keyboard.

- Test the display. The item selected from the ComboBox should enable the button. The other buttons should be disabled.

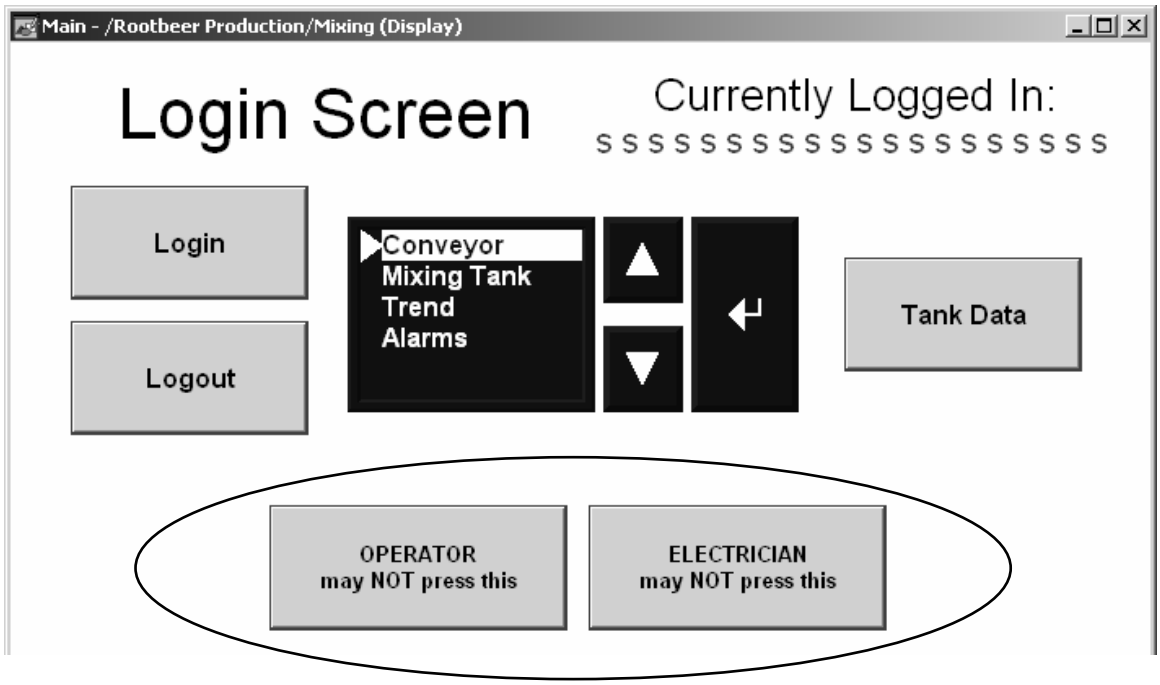


- Save and close the graphic display.

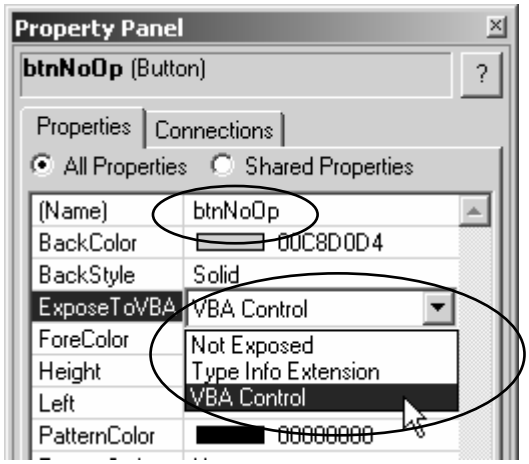
Part C

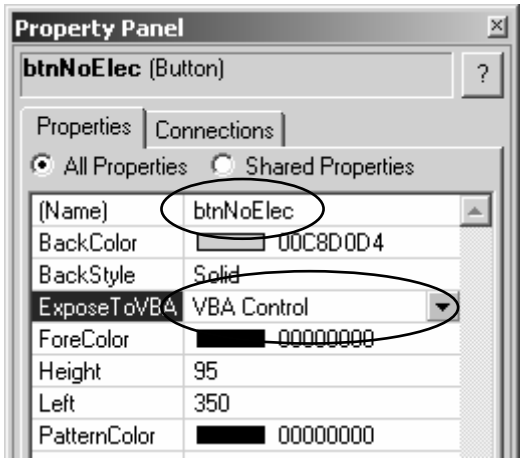
Now integrate VBA into an existing graphic. You will add VBA code to enable or disable pushbuttons based on the security code of the logged on user.

- Open the **Main** graphic display from Lab 13.
- Add two RSView buttons at the bottom of the graphic.
- Give them the captions as shown below:



- Rename the buttons and expose them to VBA. Right-click a button and select Property Panel. Name the button on the left **btnNoOp**. Select **VBA Control** from the ExposedToVBA property. Leave the Property Panel open and select the button to the right. Name it **btnNoElec** and give it VBA Control.



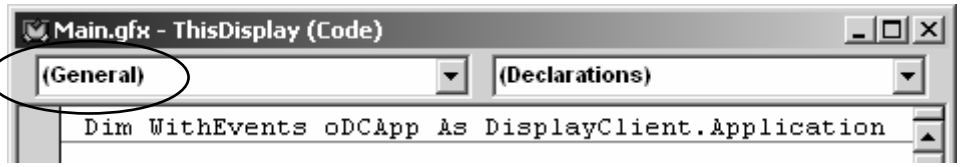


You will now write VBA code to disable the left button when the Operator is logged in, and disable the right button when the Electrician is logged in.

First you will dimension a variable. You need to create an object to represent the Display Client Application. The object will be named **oDCApp**. Use the **WithEvents** keyword to allow the object to raise events. You will trigger code from one of the events in a later step.

- Type **F7** to open the VBA window.
- Select **(General)** from the objects drop down list.
- Enter the code:

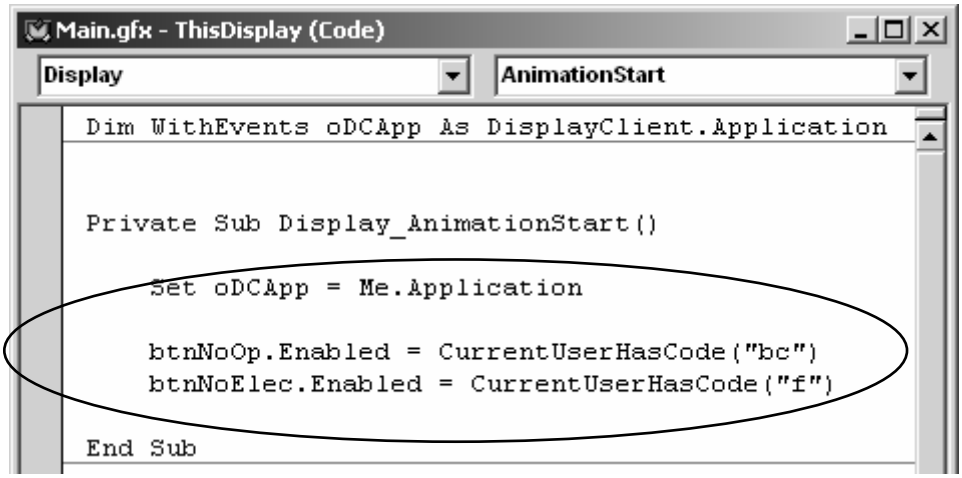
```
Dim WithEvents oDCApp As DisplayClient.Application
```



Add code to set the variable (oDCApp) to your particular Display Client Application, and to enable or disable the pushbuttons based on who is logged in. This code will run when the display starts – when the **Display AnimationStart** event occurs.

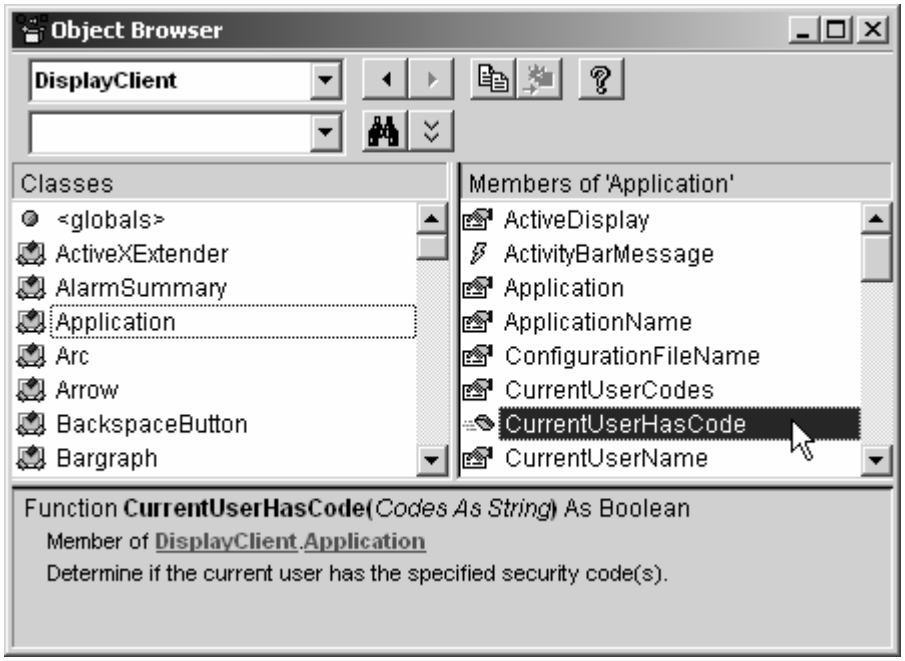
The button *object* has an enabled *property*. Set this property based on the security code of the logged on user. Test for this code by using the *CurrentUserHasCode* method of the *Application* object.

- Select the Display object, AnimationStart event. Enter the following code:



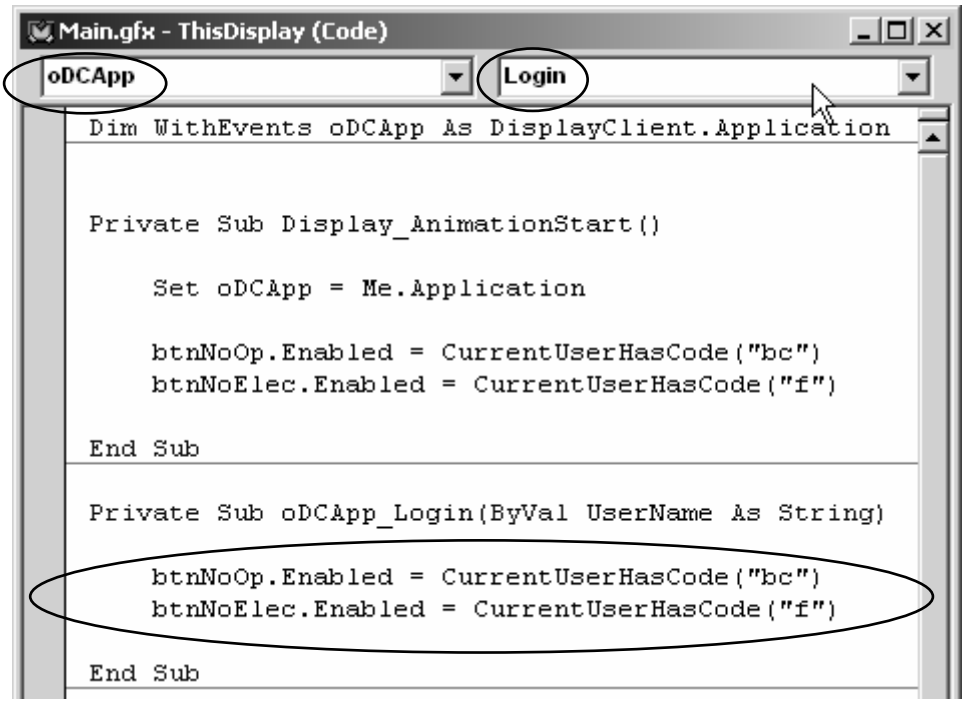
Reference the User Accounts editor to see that the Operator account does not have access to codes B or C, while all others do. The Electrician does not have access to F.

Tip – Find out more about the available properties, methods and events of the Application object by using the VBA Object Browser.



The code you entered above will only check the security codes when the display first starts up. It will need to be checked whenever someone logs in. Accomplish this by repeating the button code in the **Login** event of the **oDCApp** object you created earlier.

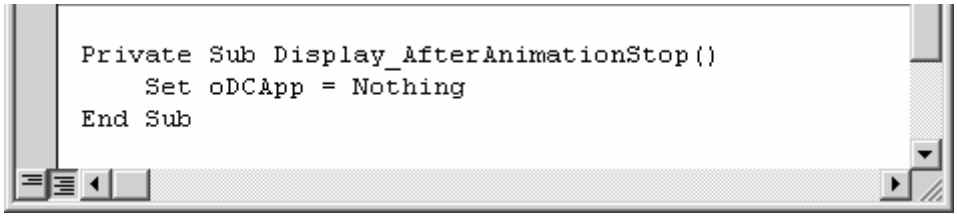
- Select the **oDCApp** object, **Login** event.
- Copy and Paste the two lines of code from the earlier subroutine.



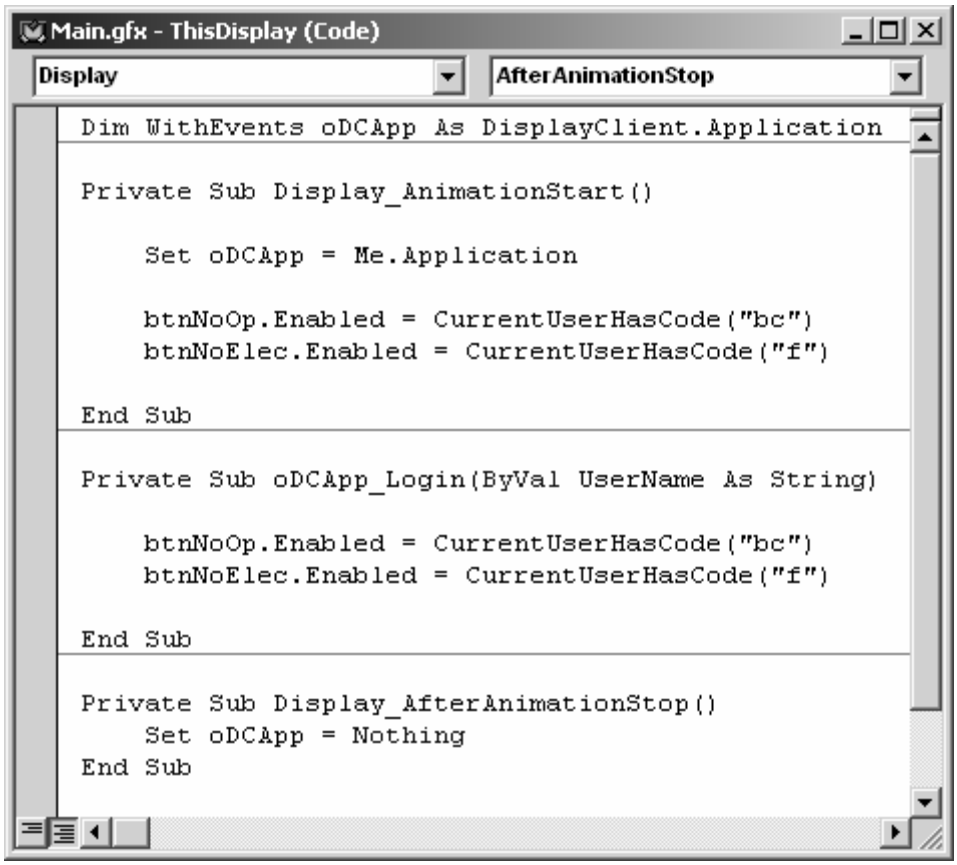
Note – the default event for the oDCApp object is **ActivityBarMessage**. A subroutine will automatically be created for this. You may delete it.

Finally, it is good practice to destroy an object that has been created in code.

- Select the **Display** object, **AfterAnimationStop** event.
- Enter the following line of code in the subroutine:



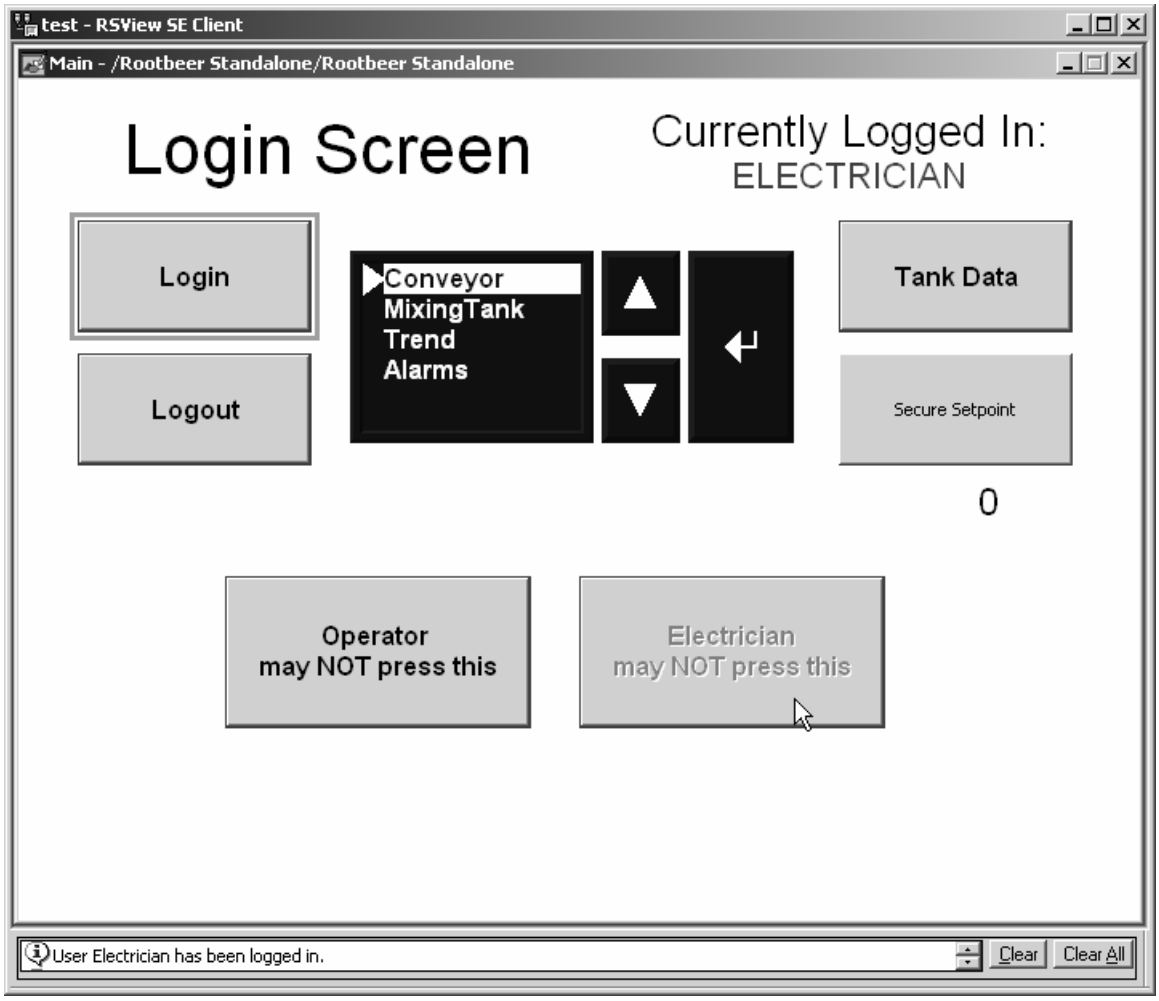
The complete code looks like this:



- Save the graphic display.

Test the functionality of the code by running the client file from the last lab.

- Log in as both **operator** and **electrician** and see the effects on the buttons.



- Close the client window when you are done.

This Lab is Finished.

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14. *Creating a Distributed Application*

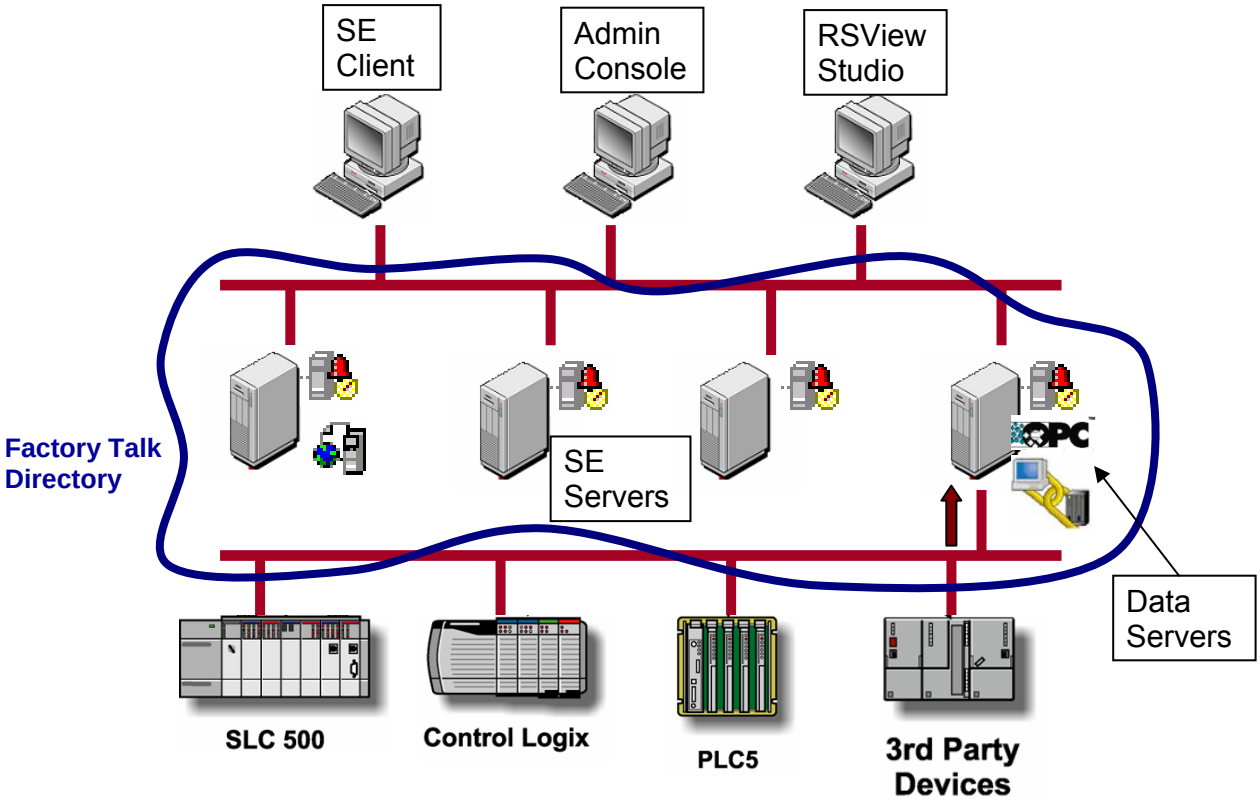
Objectives:

- Understand the layout and architecture of a distributed RSView SE application
- Understand how to incorporate Redundancy into a distributed application
- Create a distributed application from existing Stand-alone HMI projects
- Deploy SE components from a single computer to a distributed environment

The Distributed Application

RSView Supervisory Edition is built upon a Client/Server model. It may be distributed among many computers.

One example of a distributed application:



RSView SE Servers contain the HMI Projects and serve up the graphics, handle alarms, data logging etc… The SE Server runs headless, without a user interface.

Data Servers, such as RSLinx or 3rd party OPC servers, supply controller information.

Clients are the recipients of this data.

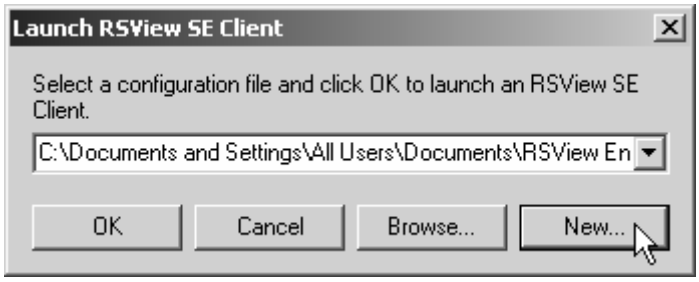
> **RSView Studio**, the editing environment used throughout this class, is a client.
>
> **RSView SE Client** is the runtime software for viewing and interacting with applications developed using RSView Studio.
>
> **RSView SE Administration Console** is client software for administering RSView Supervisory Edition applications after they have been deployed. The Administration Console contains a sub-set of the RSView Studio editors, so you can make minor changes to an application. There is no licensing associated with RSView SE Administration Console.

RSView SE Client

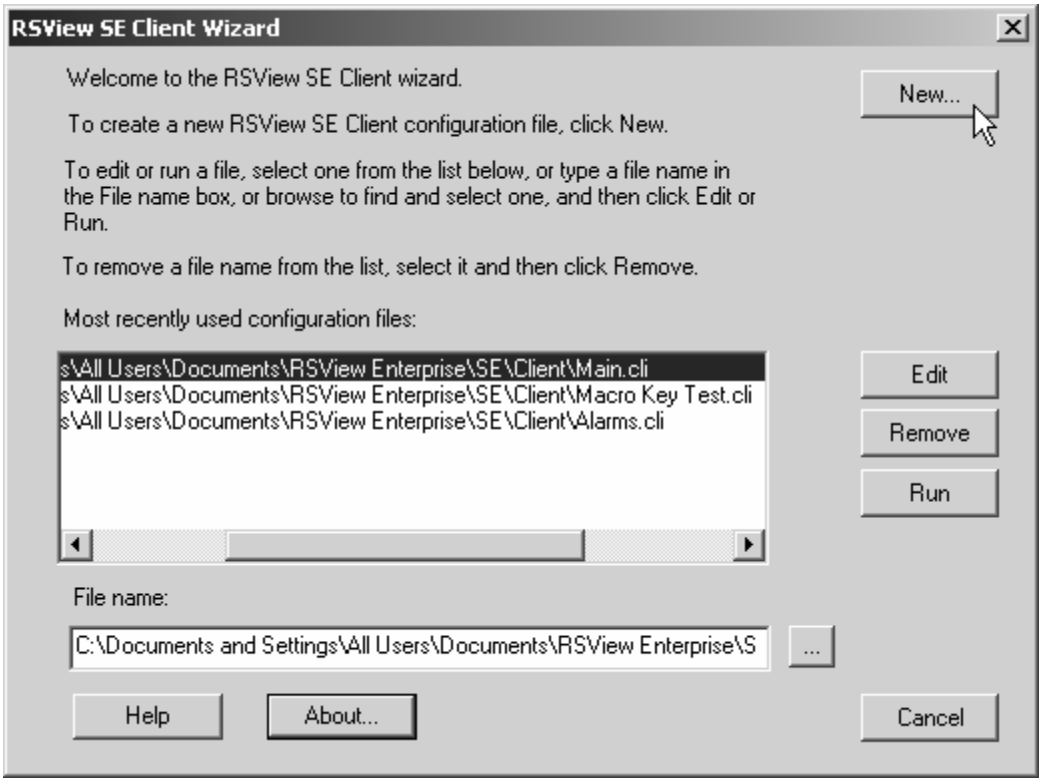
RSView SE Clients are deployed to a runtime computer with an RSView SE Client software installed.

Create a client file in RSView Studio. These files have the **.cli** extension. Select **Launch SE Client** from the **Tools** menu.

Click **New** to create a new client file.



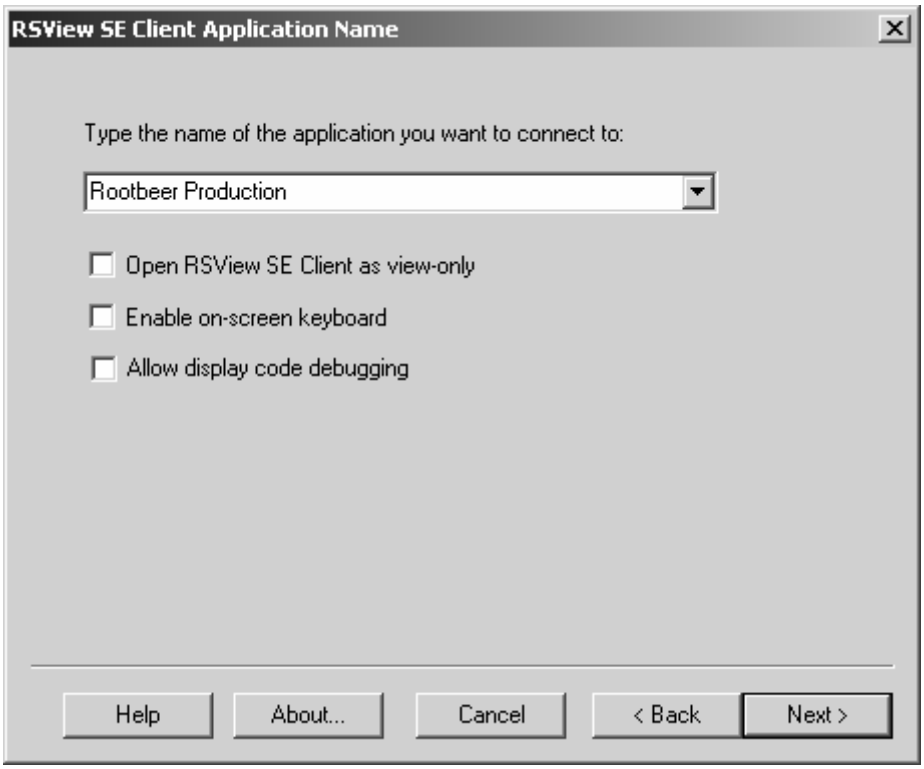
This will launch the RSView SE Client Wizard. Use the wizard to configure a new client file, edit existing files, or remove files. Removing a file from the list does not delete if from the computer.


RSView SE Client Wizard
Welcome to the RSView SE Client wizard.
To create a new RSView SE Client configuration file, click New.
To edit or run a file, select one from the list below, or type a file name in the File name box, or browse to find and select one, and then click Edit or Run.
To remove a file name from the list, select it and then click Remove.
Most recently used configuration files:
s\All Users\Documents\RSView Enterprise\SE\Client\Main.cli
s\All Users\Documents\RSView Enterprise\SE\Client\Macro Key Test.cli
s\All Users\Documents\RSView Enterprise\SE\Client\Alarms.cli
File name:
C:\Documents and Settings\All Users\Documents\RSView Enterprise\S
New...
Edit
Remove
Run
...
Help
About...
Cancel

The SE Client wizard may also be started by running Start, Programs, Rockwell Software, RSView Enterprise, RSView SE Client.

RSView SE Client Options

The SE Client wizard will allow you to customize the client file:



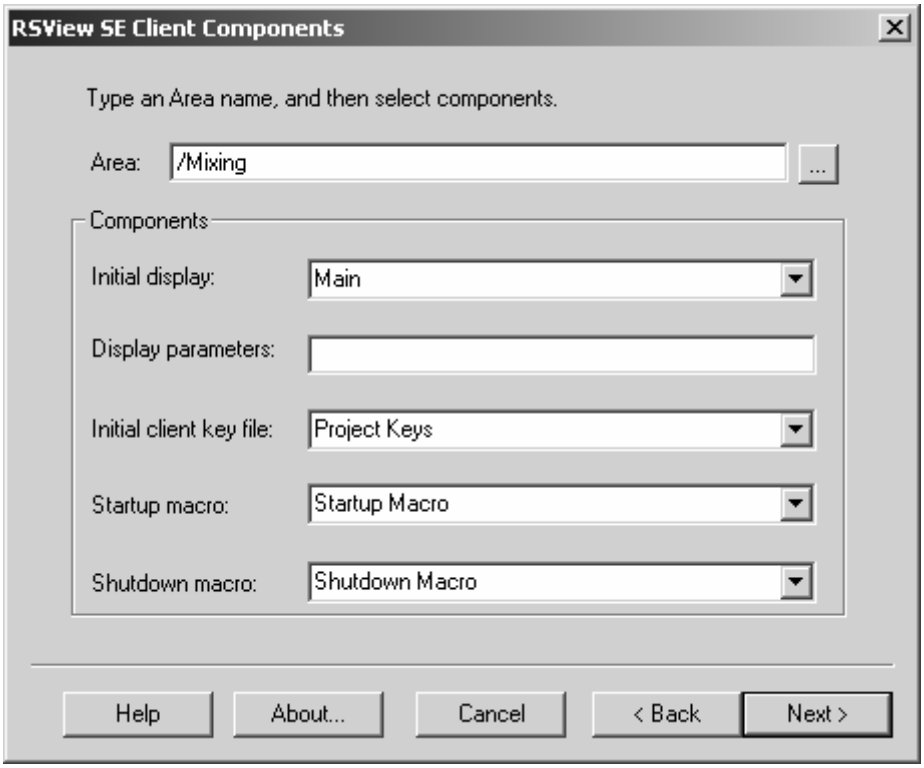
The dropdown box will show you all the Applications in the FactoryTalk Directory.

Open RSView SE Client as view-only - Click this check box if the SE Client is to be opened as a view-only client. When an SE Client is opened in view-only mode, the user can only perform read operation (rather than read/write). This means that tag writes, recipe saves, actions allowed from an alarm summary, and commands processed on the HMI server, are disabled.

Enable on-screen keyboard - Click this check box to enable the display of an on-screen keyboard when the user touches or clicks the user name or password field in the login dialog box, or a string or numeric input field.

Allow display code debugging - Click this check box to give the user access to the VBA Code editor. This allows the user to make changes to the Display Code associated with a graphic display.

Client Components

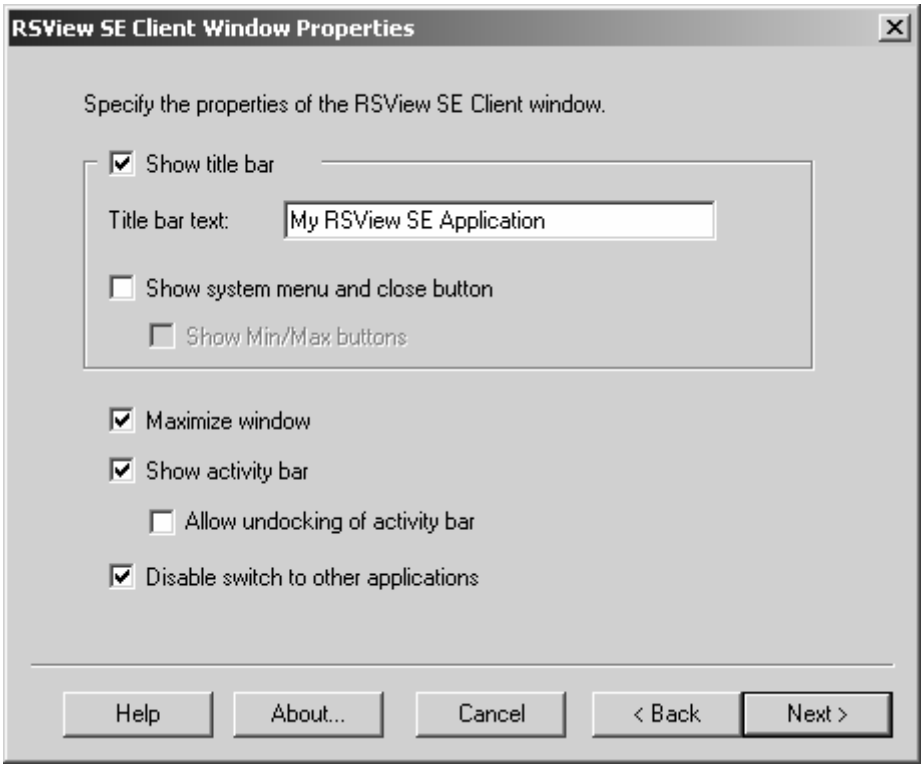


For a distributed application, type the name of the area the components are stored in, or click the browse button to open the Area browser and choose one. This option is not available for stand-alone applications.

If the area you select does not contain an HMI server, an error message is displayed, but you can click OK and continue with the create of the configuration file. This allows you to create an SE Client before you have set up the HMI server it will connect to.

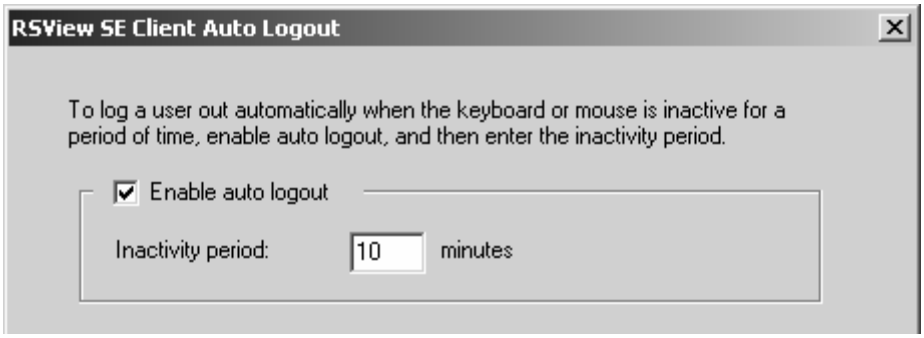
Specify the components to run automatically upon client startup.

Client Window Properties



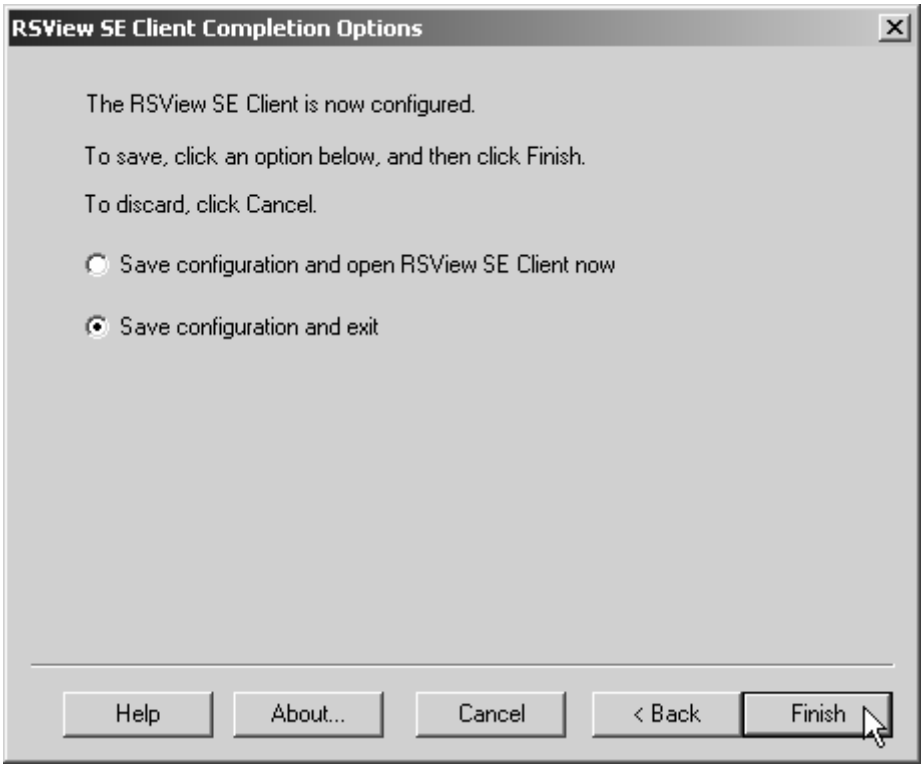
The settings in this step determine how the SE Client will look and behave when it is open.

Client Auto Logout


RSView SE Client Auto Logout
To log a user out automatically when the keyboard or mouse is inactive for a period of time, enable auto logout, and then enter the inactivity period.
Enable auto logout
Inactivity period:
10
minutes

You can set up the configuration file for an SE Client so that after a period of mouse or keyboard inactivity the client logs out the current user automatically. All graphics will be closed, and a login screen will show.

Finishing the Client Configuration


RSView SE Client Completion Options
The RSView SE Client is now configured.
To save, click an option below, and then click Finish.
To discard, click Cancel.
Save configuration and open RSView SE Client now
Save configuration and exit
Help
About...
Cancel
< Back
Finish

The last step of the configuration file is simply to save the file, or save the file and open it to test the client configuration.

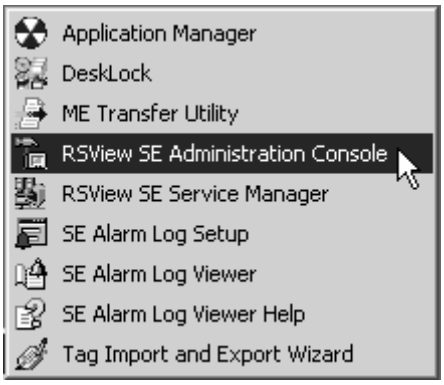
RSView SE Administration Console

The RSView Administration Console is a license-free editing client for making small changes to an existing application. You don't need to have RSView Studio installed on a computer to do this administration.

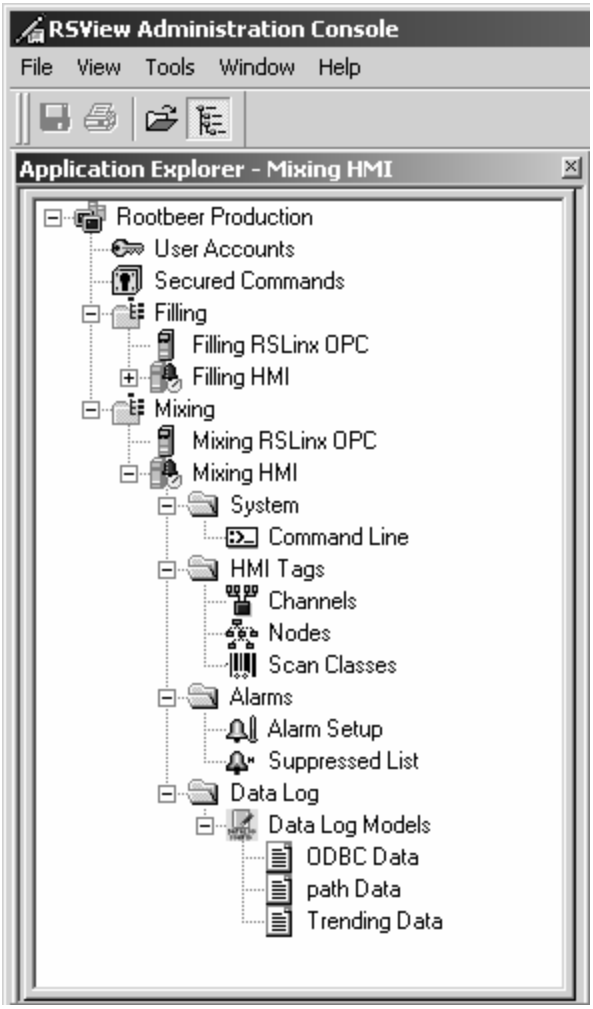
With the RSView Administration Console you can:

- add users to, or remove users from the system, using the User Accounts editor
- change an HMI server's properties
- change a data server's properties
- change which commands are secured, and which users can access the commands, using the Secured Commands editor
- run RSView commands from the Command Line
- change direct-driver network setup using the Channels, Nodes, and Scan Classes editors
- change how alarms are logged and annunciated, using the Alarm Setup editor
- add tags to, or remove tags from the Suppressed List, for testing alarms
- change the path of data log models
- change what activities are logged, and how frequently, using the Activity Log Setup editor on the Tools menu
- change the location to which alarms are logged, and manage log files, using the Alarm Log Setup editor on the Tools menu
- import and export HMI tags using the Tag Import and Export Wizard on the Tools menu

Open the RSView Administration Console from the **Start, Programs, Rockwell Software, RSView Enterprise, Tools** menu.



The Administration Console Application Explorer



Use the editors and the Tools menu to make changes to your application.

The RSView SE Administration Console has a 2 hour time limit per session.

RSView SE Command Execution

When an RSView command is issued from an RSView SE Client, from a graphic display for example, it is validated for security privileges and then processed. Some commands are processed on the client, while others are ignored or else sent to the HMI server for processing.

All commands issued by the SE Client that are processed on the HMI server, are logged to the server's activity log file or activity bar according to the RSView activity log settings on the server.

If a command cannot be processed or generates an error, an error message appears in the activity bar on the SE Client.

When you issue a command from an SE Client that is to be processed on the HMI server, it will be processed in the context of the client user. The security privileges of the user currently logged onto the server do not matter.

Commands Executed Locally

The following commands are executed locally on the HMI Server, SE Client, RSView SE Studio, or Administration Console that issued the command.

- = (Equals)
- ActivityLogNewFile
- ActivityLogSendToODBC
- AlarmLogRemark
- AppAbort
- AppActivate
- AppStart
- Beep
- DDEExecute
- Pause
- PlayWave
- Ramp
- Remark
- Set
- Toggle

Commands Executed by the SE Client Only

The following client-side commands are only executed when they are issued from an SE Client and are always executed on the SE Client. They are ignored when issued from the RSView SE Studio, Administration Console, or an HMI Server.

- Abort
- Display
- DisplayClientClose
- DisplayClientOpen
- FlushCache
- Key
- Login
- Logout
- NextWindow
- PrevWindow
- PrintDisplay
- PullForward
- PushBack
- SetFocus

Commands Ignored by the HMI Server

The following commands are executed on the SE Client, RSView SE Studio, or Administration Console that issued the command. The commands are ignored when they are issued from an HMI server.

- Define
- DownLoad
- DownLoadAll
- Help
- Identify
- Invoke
- NextPosition
- Position
- PrevPosition
- RecipeRestore
- RecipeSave
- ScreenPrint
- SendKeys
- Undefine
- UpLoad
- UpLoadAll

Commands executed on the HMI Server Only

The following commands can be issued from an SE Client, RSView SE Studio, Administration Console, or HMI Server. They are always executed on an HMI server.

- Acknowledge
- AcknowledgeAll
- AlarmEvent
- AlarmLogNewFIle
- AlarmLogOff
- AlarmLogOn
- AlarmLogSendToODBC
- AlarmOff
- AlarmOn
- AlarmPrintOff
- AlarmPrintOn
- DatalogChangeRate
- DatalogMergeToPrimary
- DatalogNewFile
- DatalogOff
- DatalogOn
- DatalogRenameFile
- DatalogSnapShot
- DatalogSwitchBack
- DerivedOff
- DerivedOn
- DriverPrimary
- DriverSecondary
- DriverToggle
- EventOff
- EventOn
- HandShakeOff
- HandShakeOn
- NodeDisable
- NodeEnable
- NodeSwitch
- Silence
- SilenceAll
- SuppressOff
- SuppressOffAll
- SuppressOn

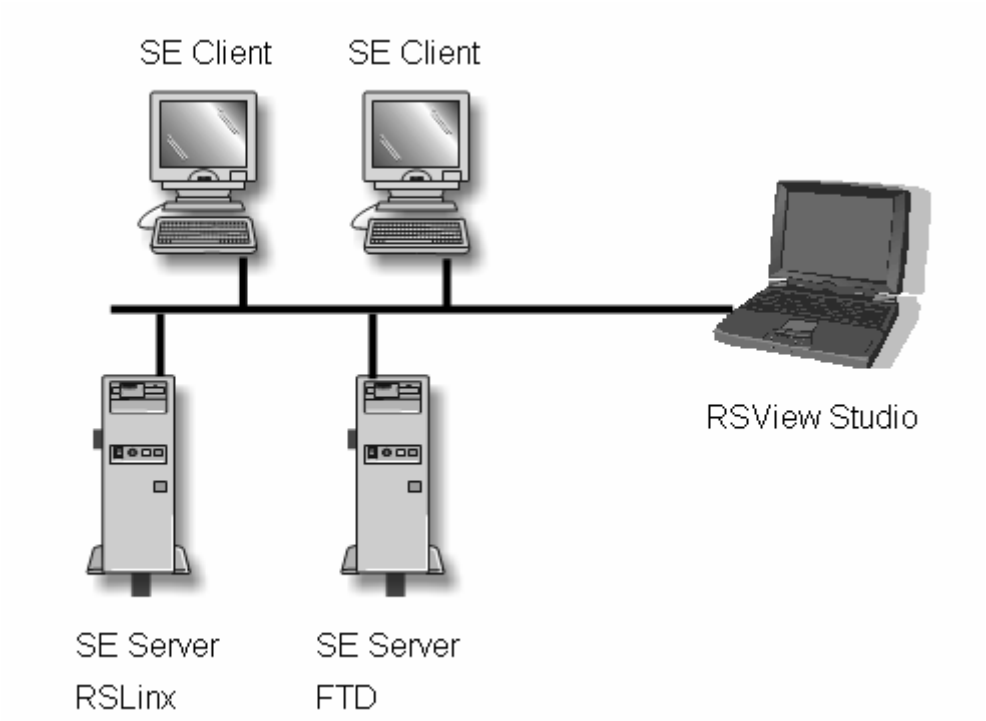
Deploying A Distributed Application

RSView SE has a level of flexibility that allows you to develop an entire application on one computer, then deploy it to a distributed network of computers before runtime.

For example, an engineer has developed an entire SE application on a laptop computer:

RSView Studio
SE Server (2)
SE Client (2)
FactoryTalk Directory
RSLinx OPC Server

At runtime, the distributed application will look like this:



Steps to Deploy the Application:

- Install the appropriate software on the runtime computers.

- Configure RSLinx (or other OPC servers) on the runtime data server computers with the appropriate OPC Topics. You may use the RSLinx Backup / Restore utility to automate this.

- Move the application file (*.rnad) from the development computer to the runtime FactoryTalk Directory computer. The application file is in this path:

\Documents and Settings\All Users\Application Data\Rockwell\RNAServer\Global

- Move the HMI Project files from the development computer to the appropriate runtime HMI Server computers. The HMI Projects are in this path:

\Documents and Settings\All Users\Documents\RSView Enterprise\SE\HMI Projects

Note: If the HMI server is configured to load and run upon the operating system starting, you will have to use the RSView SE Service Manager (Programs, Rockwell Software, RSView Enterprise, Tools) to stop the HMI Server before copying the project files.

- Move the client files (*.cli) from the development computer to the runtime SE Client computers. The location is not important. The client will simply run the file. The client files may be included in the Windows Startup, or be started automatically by using the DeskLock utility. By default, client files are in this path:

\Documents and Settings\All Users\Documents\RSView Enterprise\SE\Client

- Run the **Specify FactoryTalk Directory Location** utility on every computer to point it to the new FactoryTalk Directory.

- Open RSView Studio (or the RSView Administration Console) and edit the application. The HMI and Data Servers will be in error - they are still configured for the engineering laptop computer. Edit the properties of the HMI and Data Servers to reflect their new location.

- Make any necessary changes to the RSView Users from RSView Studio or the Administration Console. Change Domain and User information as needed for the new runtime environment.

Depending on your application, you may have database and logging changes to make as well.

See Chapter 25 of the Online Books Users Guide for more information (Help menu).

RSView SE Redundancy

You may implement three types of software redundancy within an RSView SE application:

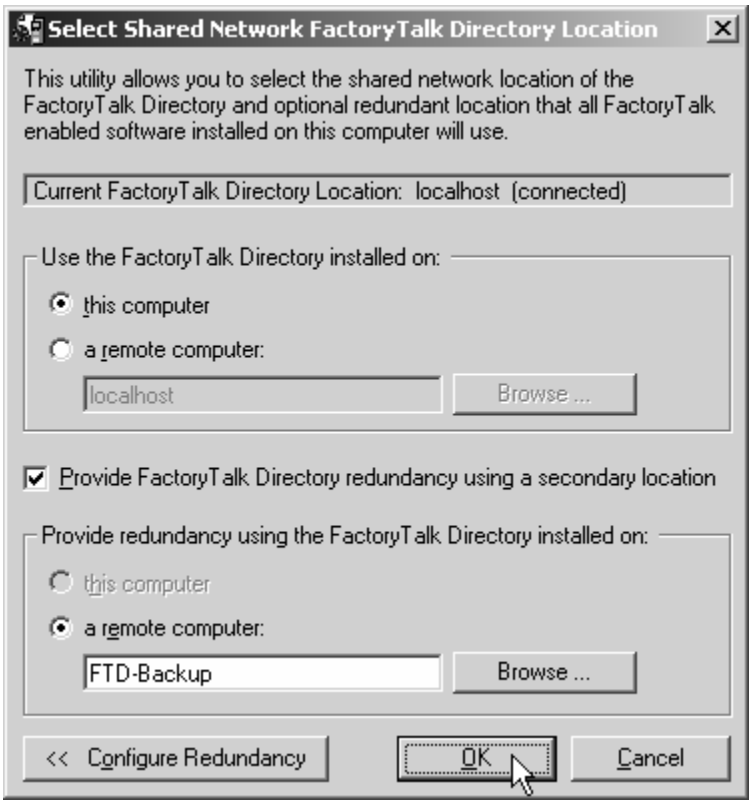
- FactoryTalk Directory
- Data Server
- HMI Server

FactoryTalk Directory

If the FactoryTalk Directory becomes unavailable while an application is running, the application will continue to run correctly. SE Clients will be able to read and write values, acknowledge alarms, open and close displays, and so on, even if no redundant FactoryTalk Directory is present on the network. This is because a copy of the information provided by FactoryTalk Directory is stored locally on each computer that is connected to the FactoryTalk Directory. However, while FactoryTalk Directory is disconnected, you cannot modify an application's structure—for example, you cannot add or remove an area, a data server, or an HMI server.

To ensure that you can modify an application's structure while FactoryTalk Directory is unavailable, set up a redundant computer running FactoryTalk Directory.

FactoryTalk Directory Redundancy is configured with the **Specify FactoryTalk Directory Location** wizard.


Select Shared Network FactoryTalk Directory Location
This utility allows you to select the shared network location of the FactoryTalk Directory and optional redundant location that all FactoryTalk enabled software installed on this computer will use.
Current FactoryTalk Directory Location: localhost (connected)
Use the FactoryTalk Directory installed on:
this computer
a remote computer:
localhost
Browse ...
Provide FactoryTalk Directory redundancy using a secondary location
Provide redundancy using the FactoryTalk Directory installed on:
this computer
a remote computer:
FTD-Backup
Browse ...
<< Configure Redundancy
OK
Cancel

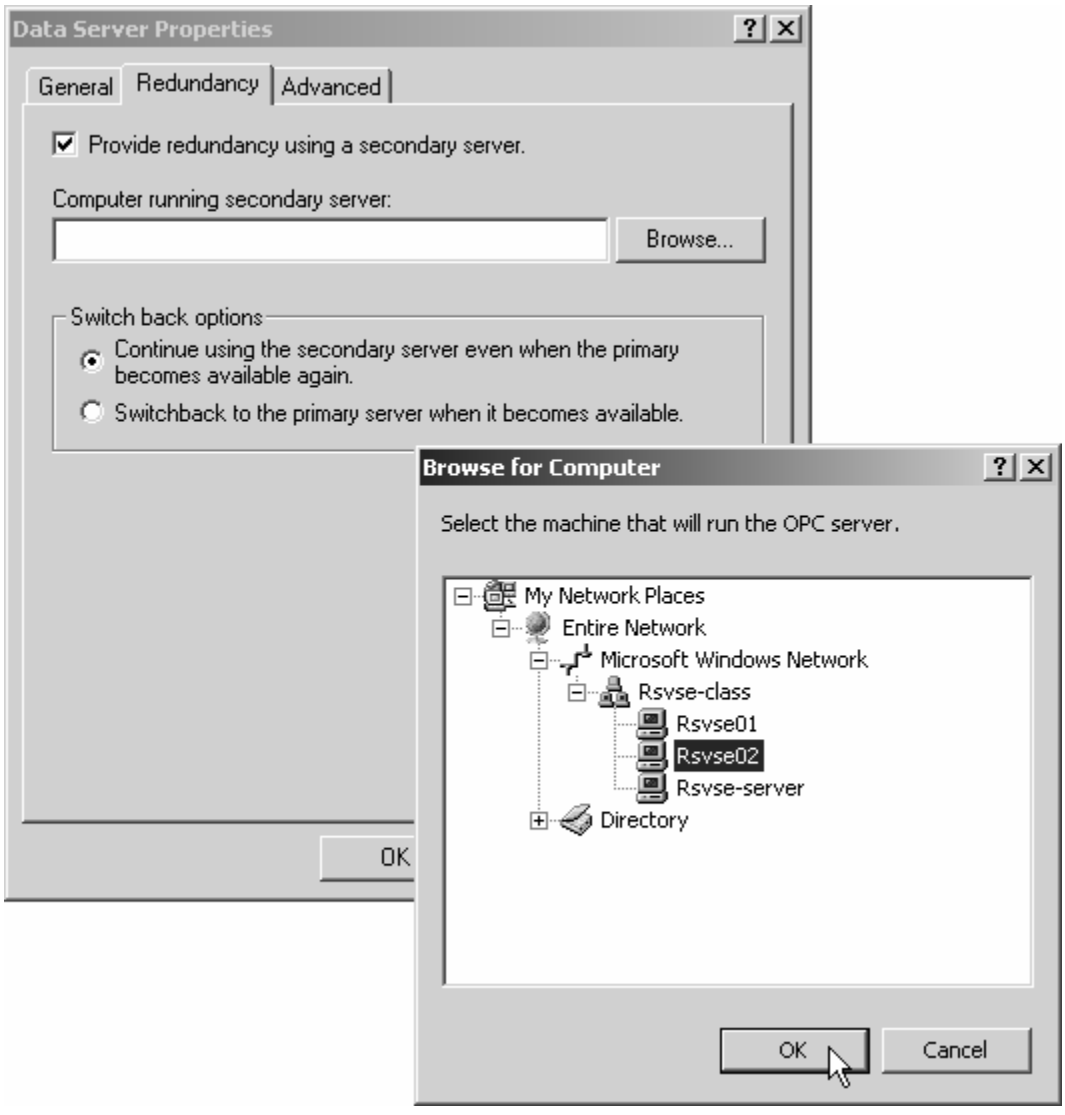
Data Server Redundancy

You may specify a failover computer to supply data if the primary data server fails. An SE Client will continue to receive updates from the backup computer after a brief delay.

You may specify whether to fail back to the primary server when it comes back online, or continue to use the secondary.

The secondary computer must be configured with the same OPC Server as the primary. For redundant RSLinx, configure identical topics as well.

Configure redundancy in the Data Server Properties.

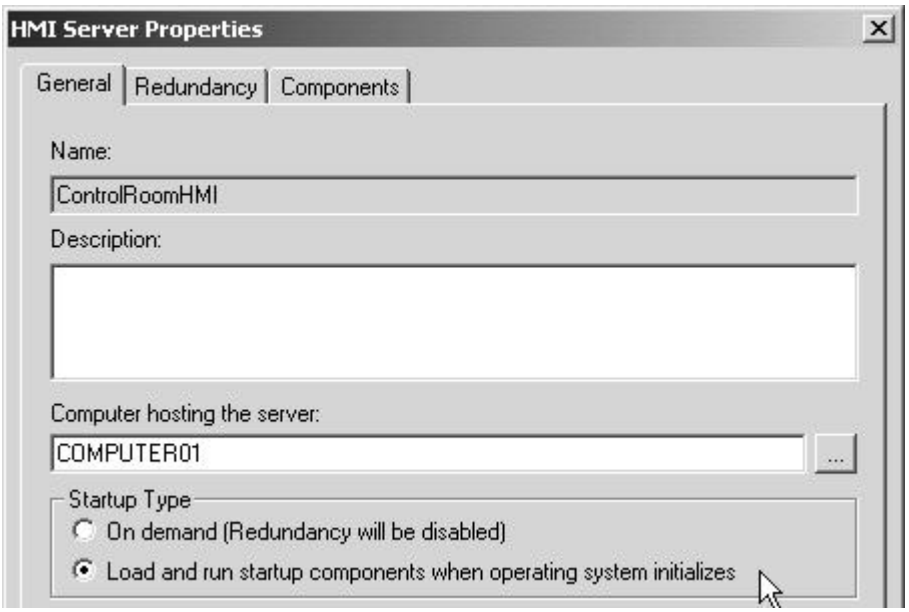


HMI Server Redundancy

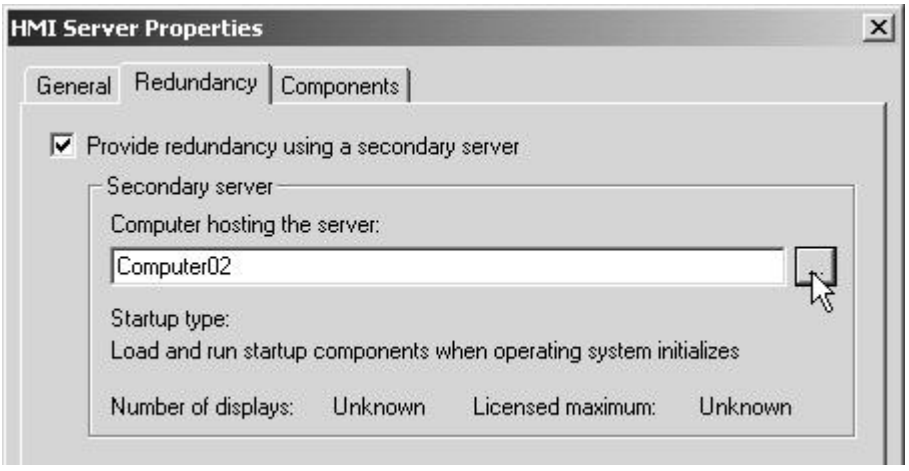
You may specify a failover computer in the event that the primary HMI Server fails. This will ensure that an SE Client is able to access graphics, and that Data Logging, Alarming, Eventing etc… continues.

A valid SE Server license is required on the Secondary HMI Server computer.

Redundancy is configured in the HMI Server Properties. HMI servers run as Windows Services. You must specify the HMI server to load and run when the operating system initializes.



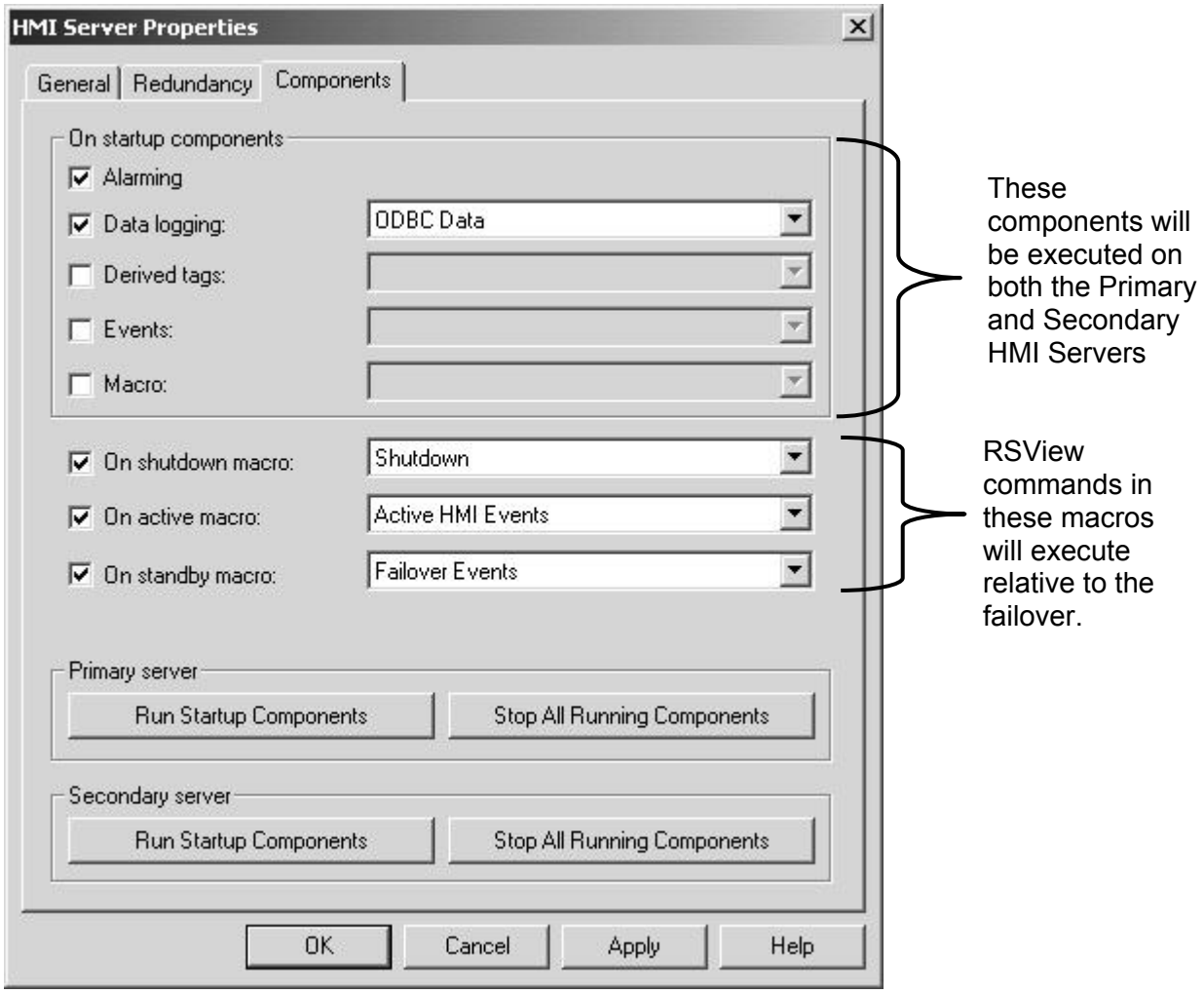
Specify the failover computer in the Redundancy Tab



RSView Studio will check that the HMI project exists on the failover computer. Clicking **OK** at this point will make a connection to the failover.

Specify the startup components in the Components Tab.

You can decide what components will run on the primary and secondary HMI Servers, and when.



Alarming - Alarm Detection occurs only on the Primary HMI, regardless of the components alarm checkbox. Alarm state information is synchronized with the Secondary HMI, so the Alarm Summary is current on a failover.

Note: HMI redundancy in RSView SE 3.0 has no project synchronization. You must manually copy the HMI project from the primary to the secondary HMI server computer. Edits to the HMI project will require a copy as well.

Lab 15 – Create a Distributed Application

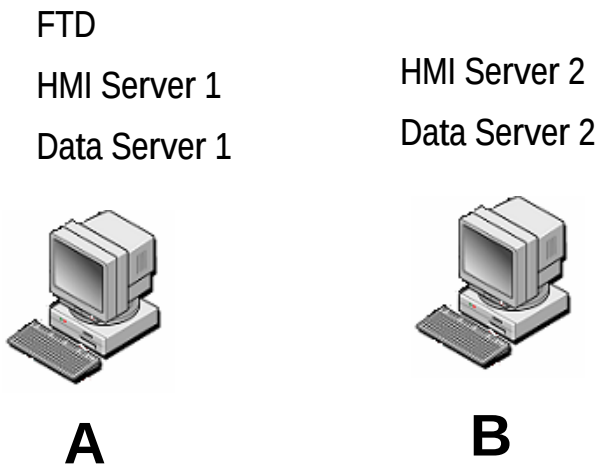
Objective: In this lab, you will create an RSView SE distributed application by incorporating your standalone application with that of a partner.

Software Requirements:

- RSView Studio
- SoftLogix 5860 running RSView_Class_SoftLogix program

You must work in a group for this lab. Form groups of two, or three if necessary.

The group will participate in a single SE Application. The application will have (2) HMI Servers and (2) Data Servers.



1. Set the FactoryTalk Directory Location:

Each computer participating in the application must point to a common FactoryTalk Directory. Every computer has the software installed from Lab 2.

- Pick one computer in the group to be the FactoryTalk Directory (Computer A). Open the **Specify FactoryTalk Directory Location** utility (Start, Programs, Rockwell Software, Utilities). Verify that the utility is pointed to This Computer, **localhost**.
- Now run the utility on the other computer(s) in the group. Change the location to use Computer A as the FactoryTalk Directory.

Select Shared Network FactoryTalk Directory Location
This utility allows you to select the shared network location of the FactoryTalk Directory and optional redundant location that all FactoryTalk enabled software installed on this computer will use.
Current FactoryTalk Directory Location: localhost (connected)
Use the FactoryTalk Directory installed on:
this computer
a remote computer:
Computer01
Browse ...
Configure Redundancy >>
OK
Cancel

Run the utility once more to confirm that you have established communications with the FactoryTalk directory. Look for **Connected** in the text.

Important - At this point, Computer B will be working on a common application with Computer A. If Computer B opens RSView Studio, the list of SE Applications to edit is coming from the FactoryTalk Directory on Computer A.

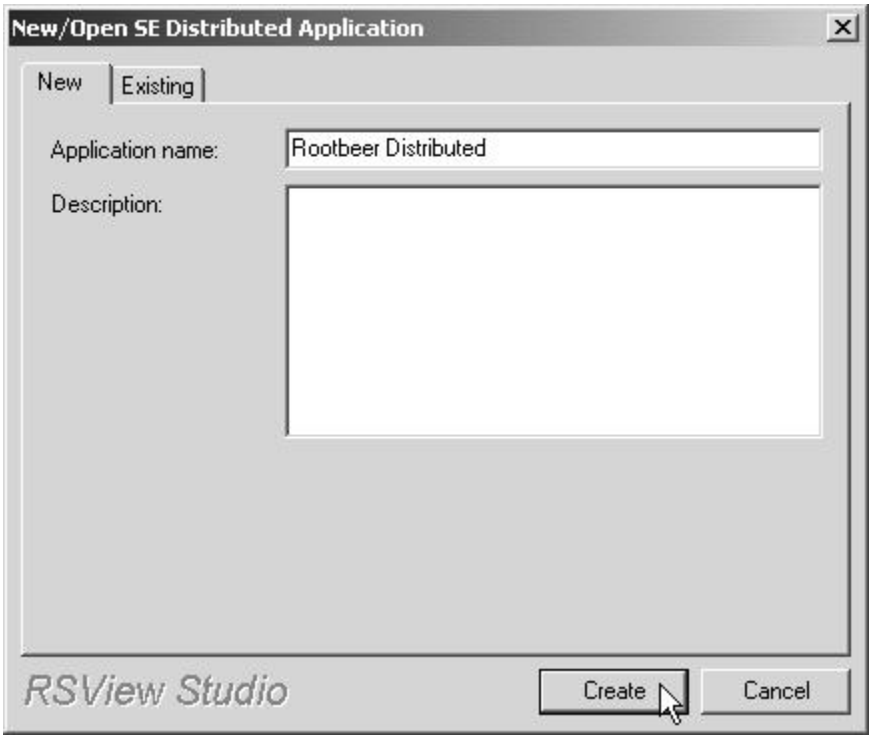
The FactoryTalk Directory holds application files in this location, on the FactoryTalk Directory computer:

```
C:\Documents and Settings\All Users\Application Data\Rockwell\RNAServer\
```

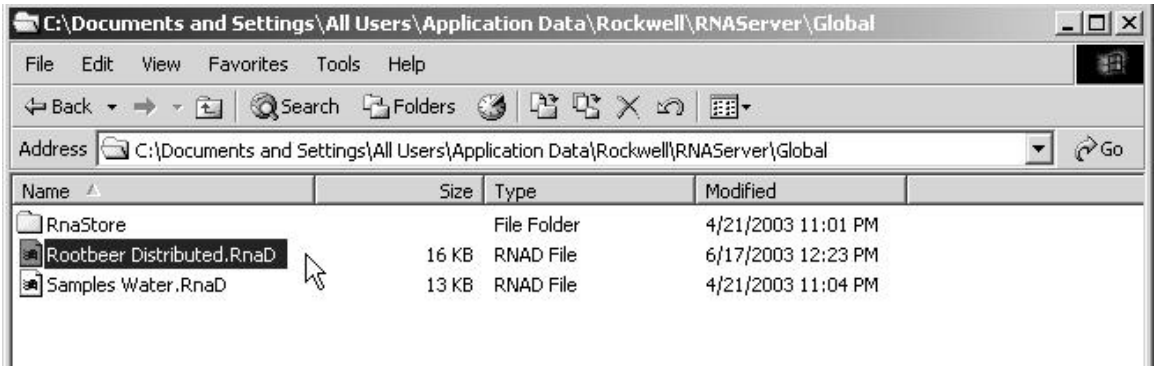
2. Create the Application

Important - Only one member of the group may do this step. Whoever is sitting at Computer **B** (not the FactoryTalk Directory) proceed:

- Open RSView Studio. Select SE Distributed. Create a new application with a unique name.



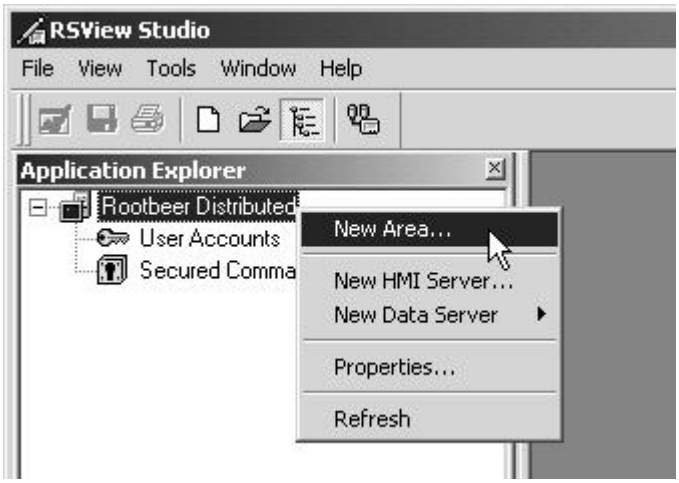
- Verify the creation of the .rnad file on the FactoryTalk Directory computer.


C:\Documents and Settings\All Users\Application Data\Rockwell\RNAServer\Global
File Edit View Favorites Tools Help
Back Search Folders
Address C:\Documents and Settings\All Users\Application Data\Rockwell\RNAServer\Global
Go
Name Size Type Modified
RnaStore File Folder 4/21/2003 11:01 PM
Rootbeer Distributed.RnaD 16 KB RNAD File 6/17/2003 12:23 PM
Samples Water.RnaD 13 KB RNAD File 4/21/2003 11:04 PM

3. Edit the Application

You want to have a single application with (2) HMI Servers. Areas need to be created in the application. Areas are logical organizers that contain a single HMI server and any number of Data Servers.

- Right-click on the root of the application and select **New Area**. Name it **Mixing**.

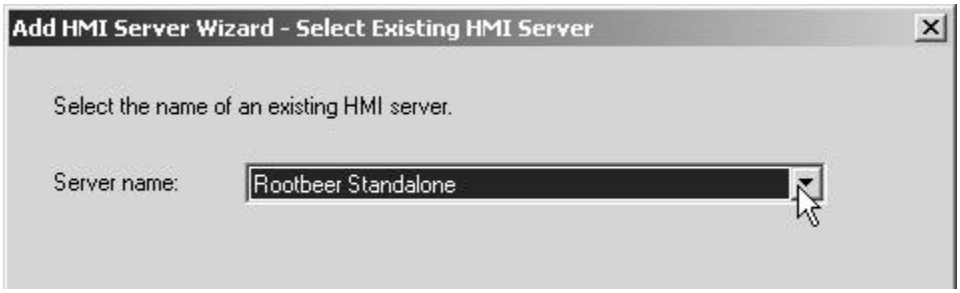


You will now incorporate the work you did on the standalone HMI by adding it to this distributed application.

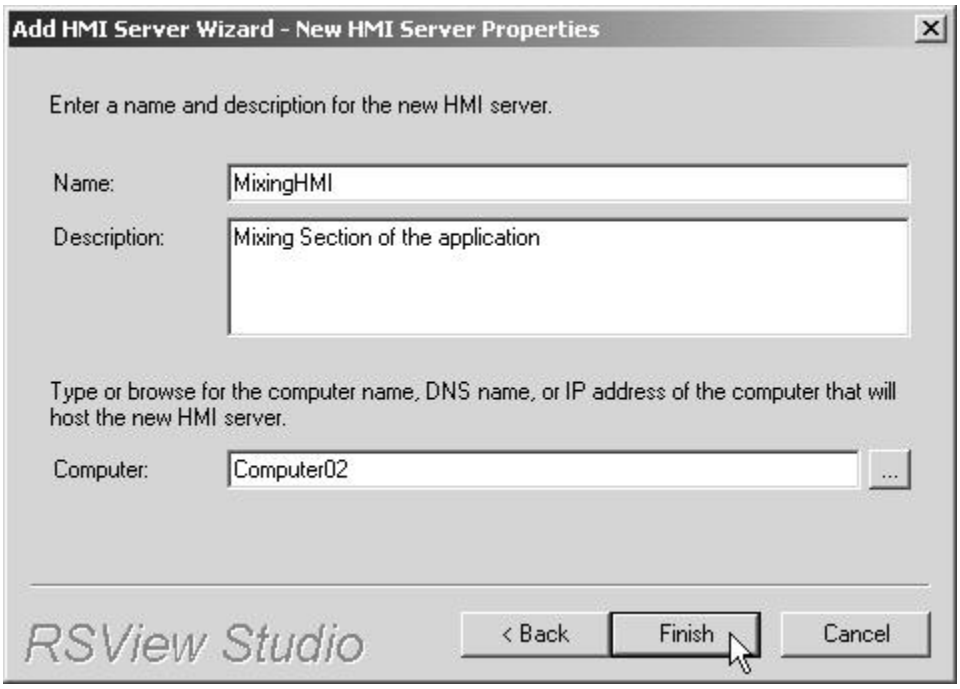
- Create an HMI Server in the Mixing Area by right-clicking on the area and selecting **New HMI Server**.
- Choose to Copy an HMI server. (HMI servers may only be associated with one application. This prevents you from attaching to the existing HMI, as it is being used by the standalone application.)

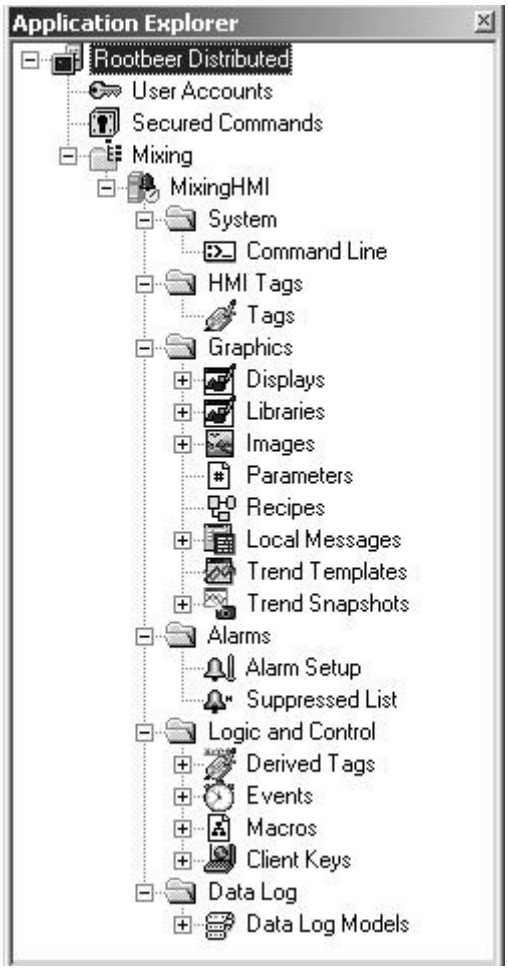
Add HMI Server Wizard - Select Operation
Select the operation to be performed.
Create a new HMI server
Copy an HMI server
Import a project
Attach to an existing HMI server
RSView Studio
< Back
Next >
Cancel

- Select the Standalone application you had created earlier


Add HMI Server Wizard - Select Existing HMI Server
Select the name of an existing HMI server.
Server name:
Rootbeer Standalone

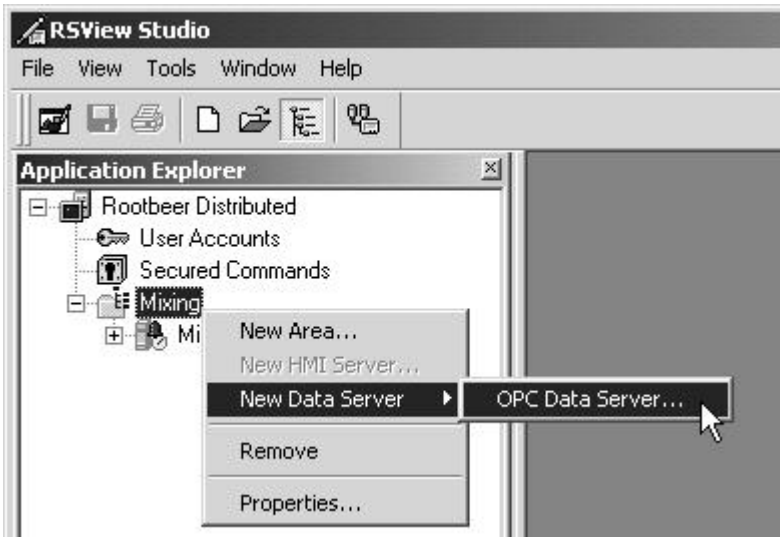
- Name the new HMI server **MixingHMI**, and keep it on the same computer (B).


Add HMI Server Wizard - New HMI Server Properties
Enter a name and description for the new HMI server.
Name:
MixingHMI
Description:
Mixing Section of the application
Type or browse for the computer name, DNS name, or IP address of the computer that will host the new HMI server.
Computer:
Computer02
...
RSView Studio
< Back
Finish
Cancel



- Click Finish to add it to the application. You should see the HMI Project now.
- Browse the HMI to see that it has the same components as your standalone.
- Verify the copied HMI files on the Computer B hard drive. You should see a **MixingHMI** folder in:
- C:\Documents and Settings\All Users\Documents\RSView Enterprise\SE\HMI Projects

- Right-click on the Mixing Area and create a new OPC Data Server.



Note: It is important that you create the Data Server inside the Area, not at the root of the application. This will ensure that the existing directly referenced tags from the standalone application retain their relative reference. For example, the standalone application uses a directly referenced tag:

`{::[RSView_Class_SoftLogix]Program:Mixing.H2O_on_off}`

Recall the syntax for directly referenced RSLinx tags:

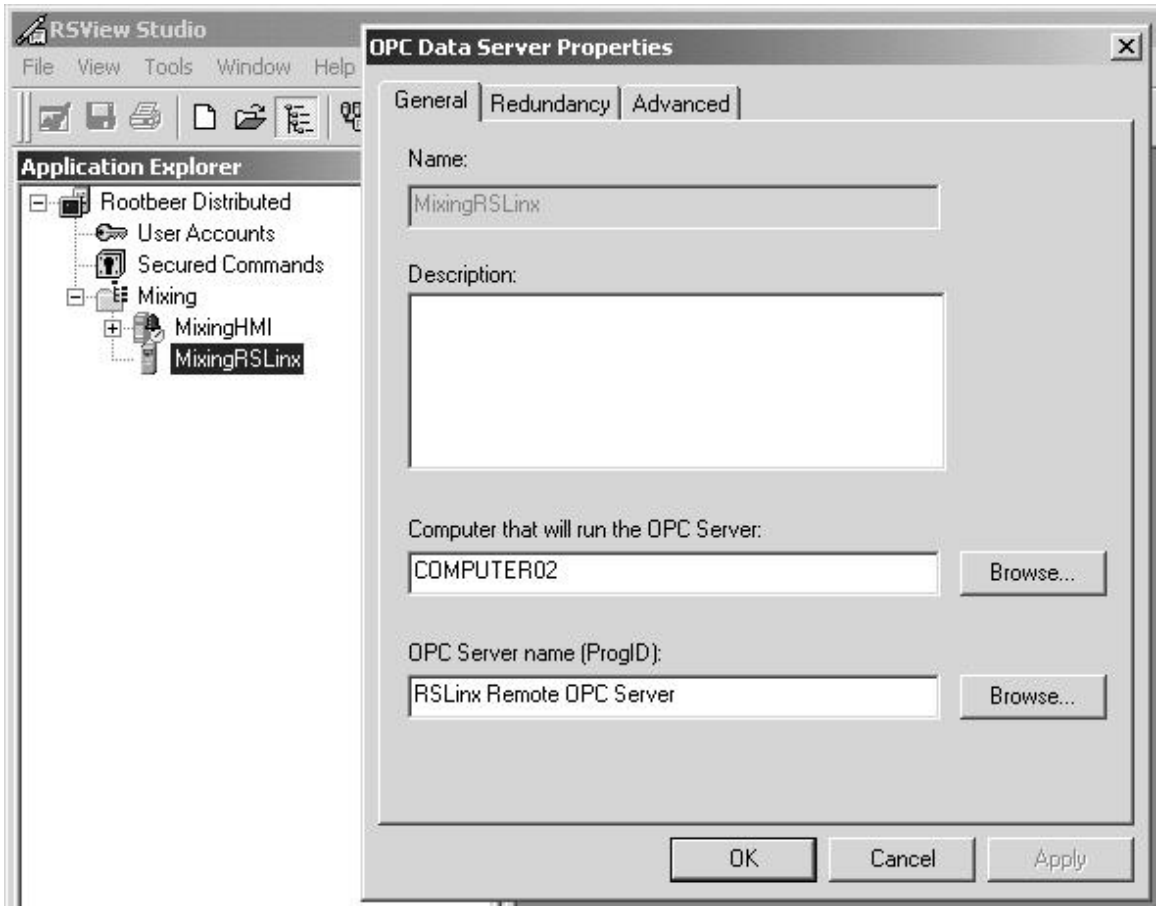
`/Area::[OPC topic]tagname`

An Area name will not be specified if the Data Server and the HMI Server are in the same Area. This is referred to as the Home Area. Standalone applications will always have this format, as Areas are not used.

A data server created at the root of the application and referenced by an HMI inside an Area will have the format:

`{/::[RSView_Class_SoftLogix]Program:Mixing.H2O_on_off}`

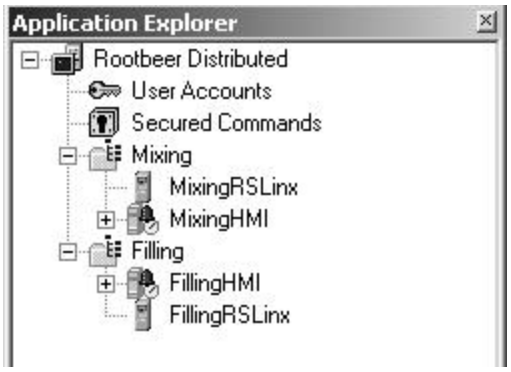
- Name the Data server **MixingRSLinx** and associate it with the RSLinx Remote OPC Server.



- Close RSView Studio on Computer B.

- Open RSView Studio on Computer A (the FactoryTalk Directory location). Open the distributed application created by your partner.
- Verify that your partner's work is in the application
- Add your own Area to the root application. Name it **Filling**.
- Add an HMI Server to the New Area. Copy your standalone HMI from the local computer and name it **FillingHMI**.
- Add a Data Server to the Filling Area. Name it **FillingRSLinx** and have it reference the RSLinx Remote OPC Server on the local computer (Computer A)

The Application should include an HMI and Data Server on each computer.



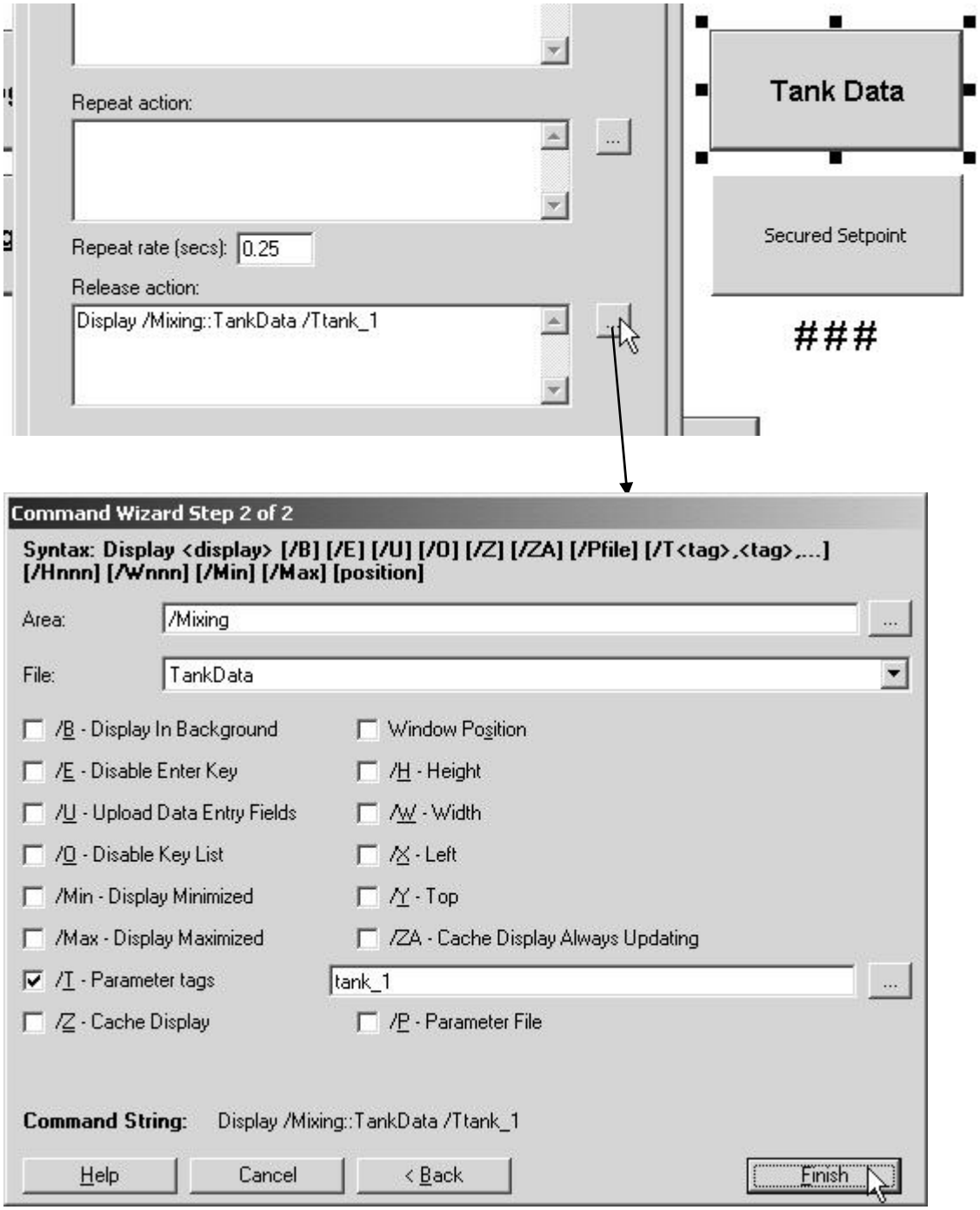
4. Add User Accounts

Recreate the RSView User and Group accounts from Lab 12. There is no way to transfer this information from one application to another.

5. Edit Existing Graphics

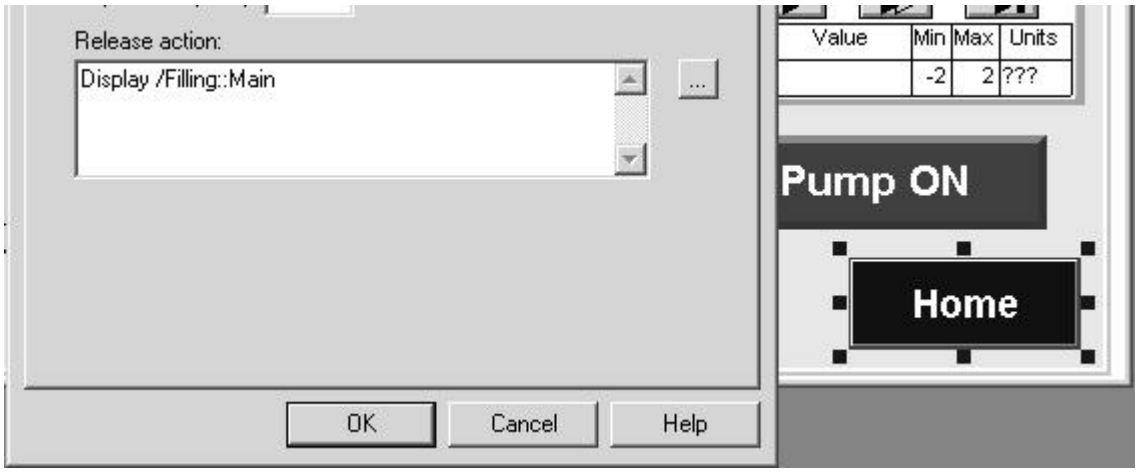
Open the existing **Main** graphic in the **Filling Area** to allow navigation across Areas.

- Double click the **Tank Data** button. Change its command to display the **TankData** display from the **Mixing** area. Use the command wizard.



- Save the changes and close the graphic.

- Open the **TankData** graphic in the **Mixing** area.
- Double-click the **Home** button and change its command to display the **Main** graphic in the **Filling** area.

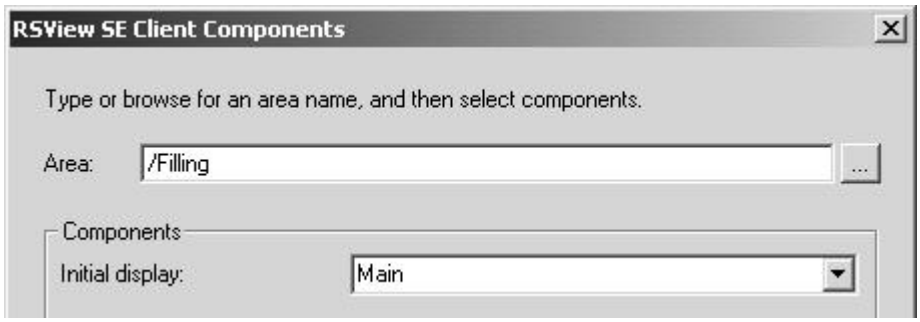


- Save the changes and close the graphic.

6. Create an SE Client

Create a new SE Client to navigate between the HMI Servers.

- Name the client **Navigate**.
- Reference the new distributed application.
- Start in the **Main** graphic in the **Filling** Area.



- Run the client and confirm that you can navigate across the HMI Servers

7. Edit the Application Online

Changes made to graphics will be updated on a running client the next time that client shows the display.

- Run the client file from the last step.
- Open the application in RSView Studio from either computer.
- Open a graphic display that the client has access to. **Conveyor** in the **Filling** area, for example. Edit the graphic somehow - add text, change colors etc…
- Save the changes to the graphic display.
- Navigate to that graphic in your SE Client. Confirm that the updated file is shown.
- Close RSView Studio and the SE Client when you are done troubleshooting.

This Lab is Finished

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